

तमसो मा ज्योतिर्गमय

SANTINIKETAN  
VISWA BHARATI  
LIBRARY

911.54

F 82





A  
REGIONAL GEOGRAPHY  
OF THE  
INDIAN EMPIRE

3290

BY

DAVID FREW, B.A.

Author of "Object Lessons in Geography"

"Regional Geography of the  
British Empire"

&c. &c.

BLACKIE AND SON LIMITED

WARWICK HOUSE, BOMBAY

LONDON AND GLASGOW

1915





# PREFACE

---

The change of method which has been introduced into the teaching of geography during the last few years has been given full expression to in this regional study of the Geography of the Indian Empire.

The first part consists of the presentation, illustration, and discussion of such essential geographical principles as have been prescribed by most of the Indian Universities as subjects of study for matriculation. The brief discussion of general principles here given should enable the scholar to apply the principles intelligently to the study of the geography of India.

India possesses such a number of regions clearly distinguished from each other by differences of soil, of climate, and of mineral, vegetable, and animal productions, that it would be hard to find any other country in the world better suited to regional study. The natural features are on a scale which cannot but be impressive—the mountain barrier in the north is so stupendous, the deserts are so vast, and the rivers are so large, so famous, and so useful for irrigation and for commerce. The races that occupy the country, too, are so numerous, and so representative, and the degree of civilization they have severally reached varies so much, that to study the peoples of India is to cover almost in their entirety human ethnology and sociology. While little is said with regard to the history of India, a history which stretches back to the dawn of civilization, care is taken to show the effect of geographical environment in determining the condition and history of each of the peoples dwelling in a particular area.

Besides the section dealing with general geographical principles, the book comprises two other parts. The first deals with the general geography of India, shows the regions into which the country is divided geographically, and states what differences in soil, climate, and productions distinguish one region from another. With this part is included a discussion of the government of the country as a whole, of the races that occupy it, of their languages and religions, of the means of communication between one part and another, and of the manufactures, productions, trade and commerce.

The second part discusses the political divisions of India, also treated regionally. In this part care is taken to show how largely the political divisions have been determined by geographical factors, and development and growth by position and environment. Maps and diagrams have been specially prepared to illustrate the principles dwelt upon in the text, and graphs to show the temperature and rainfall at different seasons of the year. From the maps and from these the scholar will realize more clearly than he could from any amount of description the meaning and effect of the monsoons, and why the climate differs so much in different parts.

To help the pupil to visualize and generalize, maps of the mountain systems, of the river valleys, of the railways, of the productions, of the races, languages, religions, &c., of India have been added; so that with the help of these and of the graphs of temperature and rainfall he should have no difficulty in obtaining a clear and rational knowledge of Indian geography.

The author acknowledges with pleasure his indebtedness to Sir Thomas Holdich's *India*, to H. J. Mackinder's *India*, to the authors of the articles in the volume "Asia" of the *Survey of the British Empire*, and more especially to the authors of the various articles in that great work the *Imperial Gazetteer of India*.

# CONTENTS

## PART I.—GENERAL GEOGRAPHY

	Page
SHAPE OF THE EARTH - - - - -	9
MAP READING—LAND FORMS - - - - -	24
Contours.	
GENERAL RELIEF OF THE GLOBE - - - - -	29
TIDES—OCEAN CIRCULATION - - - - -	35
THE OCEANS AND THEIR RELATIONS TO THE GREAT WATER PARTING - - - - -	40
CLIMATE - - - - -	43
AIR MOVEMENTS—RAINFALL - - - - -	48
CLIMATIC REGIONS - - - - -	55
PLANT LIFE—PLANT REGIONS - - - - -	58
ANIMAL LIFE ON LAND - - - - -	63
MINERALS—MANUFACTURES—COMMERCE - - - - -	65
Railways.	
RACES - - - - -	69

## PART II.—INDIA AND CEYLON

POSITION—SIZE, ETC. - - - - -	71
NATURAL REGIONS - - - - -	74

# CONTENTS

	Page
<b>MOUNTAINS</b> . . . . .	74
Himalayas—North-western Mountains—North-eastern Mountains—Continental Plain—Central India—The Deccan—Ceylon.	
<b>RIVERS OF INDIA</b> . . . . .	86
<b>GANGES VALLEY—THE BRAHMAPUTRA VALLEY</b> . . . . .	87
<b>INDUS VALLEY</b> . . . . .	92
The Rivers of Central India—The Deccan—Ceylon—The North-eastern Borderland—The North-western Borderland.	
<b>ROCKS OF INDIA AND CEYLON</b> . . . . .	100
Theories—Conclusions—Effects of Varying Weights at Surface—Kinds of Rocks—Central India and the Deccan—Mountain Region and North-west Border Region—North-eastern Border Region—Indo-Gangetic Plain—Coastal Plains.	
<b>CLIMATE OF INDIA—OF SOUTHERN INDIA</b> . . . . .	109
<b>SOIL AND PRODUCTIONS</b> . . . . .	116
Irrigation—Crops—Fruits—Botanical Regions—Indian Forests—Cattle—Sheep—Horses—Fisheries—Wild Animals—Minerals—Coal and Oil—Gold.	
<b>MANUFACTURES</b> . . . . .	132
Cotton—Jute—Silk—Woollen—Other Manufactures.	
<b>THE PEOPLE</b> . . . . .	140
Races of India—Occupations of—The People of Ceylon.	
<b>LANGUAGES</b> . . . . .	147
The Aryan Languages—Indo-Aryan—Central—Intermediate—Outer—Tibeto-Burman Languages—Summary.	
<b>RELIGIONS</b> . . . . .	157
Animists—Vedic Worship—Hinduism—Muhammadanism—Other Religions.	
<b>GOVERNMENT OF INDIA</b> . . . . .	163
Indian Local Governments—Native States.	
<b>CEYLON</b> . . . . .	168
Law—Representation—Education.	
<b>DISTRICTS</b> . . . . .	171
<b>COMMERCE</b> . . . . .	172
Exports—Imports—Harbours of India.	

INDIAN ROADS - - - - -	Page 177
History—Kinds of Roads—Recent Progress in Road-making.	
RAILWAYS - - - - -	179
Indo-Gangetic Plain—Western Hill Region—Central India and North-western Deccan—The Deccan—North-east Border.	
SEAPORTS AND RAILWAYS - - - - -	185
Calcutta—Bombay—Karachi—Madras—Comparison of.	

### PART III.—POLITICAL DIVISIONS

NORTH-WESTERN MOUNTAIN REGION - - - - -	194
NORTH-WEST FRONTIER PROVINCE - - - - -	194
BALUCHISTAN - - - - -	197
PERSIAN SPHERE - - - - -	198
AFGHANISTAN - - - - -	199
THE NORTHERN MOUNTAIN REGION - - - - -	200
KASHMIR AND JAMMU - - - - -	201
CHAMBA - - - - -	204
SIMLA HILL STATES - - - - -	205
TAMRI - - - - -	205
NEPAL - - - - -	206
SIKKIM - - - - -	208
BHUTAN - - - - -	209
EASTERN HIMALAYAS - - - - -	211
NORTH-EASTERN BOUNDARY REGION—BURMA - - - - -	212
THE INDO-GANGETIC PLAIN - - - - -	217
ASSAM - - - - -	218
MANIPUR - - - - -	221
PRESIDENCY OF BENGAL - - - - -	222
COOCH BEHAR - - - - -	225
HILL TIPPERA - - - - -	226
BIHAR AND ORISSA - - - - -	226
THE UNITED PROVINCES - - - - -	229

	Page
RAMPUR STATE - - - - -	235
THE PUNJAB - - - - -	236
NATIVE STATES - - - - -	241
BAHAWALPUR - - - - -	243
RAJPUTANA - - - - -	244
AJMER MERWARA - - - - -	247
SIND - - - - -	248
KHAIRPUR - - - - -	250
DELHI PROVINCE - - - - -	250
CENTRAL HIGHLANDS - - - - -	251
CUTCH - - - - -	251
KATHIAWAR - - - - -	252
GUJARAT - - - - -	253
CENTRAL INDIA - - - - -	255
CENTRAL PROVINCES - - - - -	260
FEUDATORY STATES - - - - -	262
THE BIHAR AND ORISSA STATES - - - - -	263
THE DECCAN - - - - -	264
MADRAS PRESIDENCY - - - - -	264
MADRAS NATIVE STATES - - - - -	266
HYDERABAD, OR THE NIZAM'S DOMINIONS - - - - -	267
MYSORE STATE - - - - -	269
COORG - - - - -	271
BOMBAY PRESIDENCY - - - - -	271
NATIVE STATES - - - - -	275
Aden - - - - -	276
PORTUGUESE POSSESSIONS - - - - -	277
CEYLON - - - - -	277
THE MALDIVE ARCHIPELAGO - - - - -	280
ANDAMAN AND NICOBAR ISLANDS - - - - -	281

# PART I

## GENERAL GEOGRAPHY

---

### SHAPE OF THE EARTH

In a general way we may say that the earth is round, like a ball.

A sphere or ball has every part of the surface at an equal distance from the centre; but it can be shown that instead of the surface of the earth being everywhere equally distant from the centre, the poles are nearer to the centre than places on the Equator. In other words, the distance through the earth from side to side at the poles is less than the distance through the earth at the Equator.

The difference is not great. The equatorial diameter is, in round numbers, 8000 miles, and the polar diameter a little more than 26 miles less. The polar diameter is therefore about one three-hundredth less than the equatorial; that is, if we suppose the earth to be fairly represented by a ball  $\frac{3}{4}$  feet in diameter, we would have to make the polar diameter only  $35\frac{1}{8}$  inches.

A sphere-like body, with one diameter shorter than the other, is called an **oblate spheroid**. The earth, however, is not flattened equally in its northern and southern halves; it is flatter towards the north than towards the south, and is not therefore a true oblate spheroid. The earth, in fact, has no regular geometrical form, and people on that account speak of it as a **geoid**, which is a word that means earth-shaped.

#### Reasons for thinking the Earth is spherical

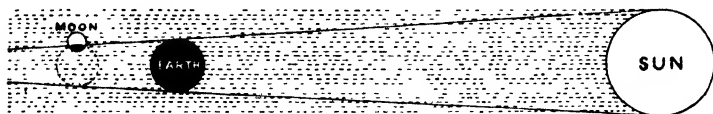
We conclude that the earth is ball-shaped or spherical because:

1. The shadow of the earth thrown on the moon during



a lunar eclipse is always circular; and only a globe or sphere throws a round shadow in all positions.

2. When a ship is seen steaming away from us the hull is



The Moon during Eclipse

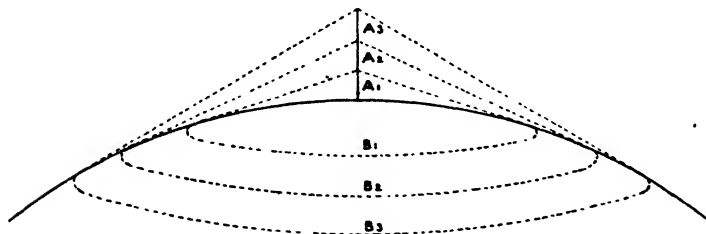
the first part to disappear, and the top of the mast the last; and when steaming towards us the first part we catch sight of is the mast or funnel and the last part the hull.



Diagram to illustrate Curvature of the Earth

3. At the Equator the pole star appears on the horizon. As the observer goes north it rises steadily above the horizon till at the pole itself it is right overhead.

4. The sun rises later for places as we go west. How



The Widening Horizon

much later it rises is determined, if we keep at a given distance from the Equator, by the number of miles we have travelled.

5. People have travelled round the earth in almost every direction, returning to the place from which they set out from the direction opposite to that which they had travelled.

6. The line where earth and sky seem to meet is always

a circle. It is called the horizon. The horizon widens as we climb a tower or a hill. By an easy calculation it is found that with a globe of 4000 miles radius the horizon would be  $2\frac{3}{4}$  miles from an eye 5 feet above the ground. And this agrees with experience.

7. When three vertical poles are set up in a straight line on a canal, each rising the same height above the water, on

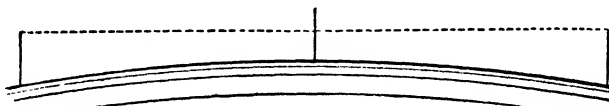


Diagram to illustrate Curvature of Water Surface in Canal

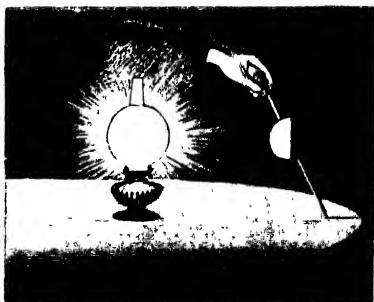
looking along the tops of the first and third the top of the second is seen to rise above the straight line joining them.

The equatorial diameter of the earth is 7926 miles, and the polar, 7900. Its equatorial circumference, therefore, is, in round numbers, 24,000 miles, and its total surface area is reckoned at 197,000,000 square miles.

### Day and Night

The earth turns round on its axis once in twenty-four hours, and this causes the apparent rising and setting of the sun and stars, in other words, causes day and night.

The poles, that is, the ends of the earth's axis, may be considered not to move; all the other places on the earth's surface move at a rate which steadily increases as we go from the poles to the Equator. At the Equator itself, places on the surface turn from west to east at the rate of a thousand miles in an hour.



Lamp and Ball

While the earth turns round on its axis, once in twenty-four hours, it also revolves round the sun. The earth's axis is inclined to the plane in which it revolves round the sun, and as the axis is at right angles to the plane of the Equator,

the plane of the Equator must also be inclined to the plane in which the earth revolves, that is to the **plane of the Ecliptic**.

The two planes are inclined at an angle of  $23\frac{1}{2}^{\circ}$ . It is this inclination of the planes of the Equator and the Ecliptic that causes the difference in the length of the days and the nights, and the differences in the heights of the midday sun above the horizon at the same place at different times of the year. It is to these that the seasons are due. This may be illustrated by the accompanying picture, which shows a ball in four different positions with relation to a lamp placed in the centre of the table to represent the sun as the source of light and energy. The slope of the wire which passes through the ball is, as will be noticed, the same in each case.

It must be remembered that as the earth is a sphere only one-half of its surface can get light and heat from the sun at

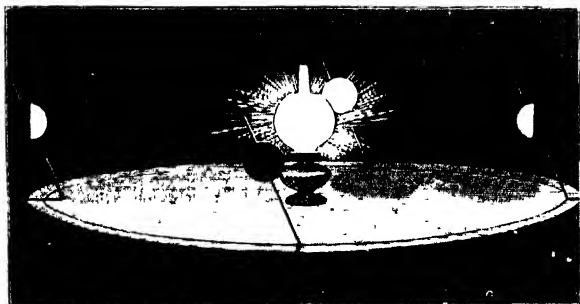


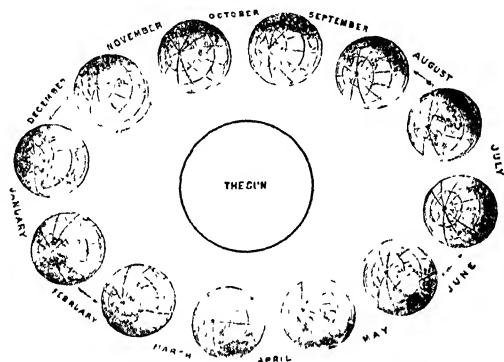
Diagram of Ball with Wire Axis in four positions, slope of wire being same in each case

one time, the other half being in the shadow. If the equatorial plane coincided with the plane of revolution, that is with the plane of the Ecliptic, the sun at **noon** would always seem overhead at the Equator, and at the **poles** it would always seem to just circle round the horizon; and **all** over the world, except at the poles, the day and the night would be always twelve hours each. Owing to the inclination of the two planes, during one half of the year more of the northern half of the earth is turned toward the sun than of the southern, and during the other half of the year more of the southern than of the northern.

The longest day in the Northern Hemisphere is the 21st of June

and the shortest is the 21st of December. These are respectively the shortest and longest days in the Southern Hemisphere. The warmest month in the Northern Hemisphere is July, and the coldest is January. In the Southern Hemisphere January is the warmest and July is the coldest month of the year.

Twice a year days and nights all over the world are of the same length. These are the times when the sun seems to cross the Equator in its progress north and in its progress south. They are called the **equinoxes**, and occur on the 21st of March and the 22nd of September respectively. The 21st of March in the Northern Hemisphere is called the "Spring" or Vernal equinox, and the 22nd of September is called the "Autumnal" equinox. The 21st of June and the 21st of December,



Yearly Motion of the Earth round the Sun

when the sun reaches his farthest north and farthest south point, and seems to come to a stand in his course and to turn back, are called respectively the **Summer** and **Winter Solstice**. At the Summer Solstice, the sun at noon seems right overhead at the **Tropic of Cancer**, and at the Winter Solstice it seems right overhead at noon on the **Tropic of Capricorn**. These two lines, which show the inclination of the plane of the Equator to the plane of the Ecliptic, are respectively  $23\frac{1}{2}^{\circ}$  north and  $23\frac{1}{2}^{\circ}$  south of the Equator. They are called **Tropics** from a Greek word which means to turn, because when it reaches the Tropics the sun seems to turn back on its course.

You must not take it that the earth turns round on its axis in *exactly* twenty-four hours. When we speak of a day, we mean the time that elapses from the time the sun passes the meridian of a place till the time it returns to it. Owing to the fact that the earth is not only turning on its axis, but is also going round the sun, a journey which it completes in  $365\frac{1}{4}$  days, the interval between two meridian passages of the sun is nearly four minutes longer than a complete revolution of the earth on its axis. The actual revolution of the earth

on its axis, that is the time that elapses between a place being in a particular position with regard to a given point in the sky and its return to the same position, is called a **sidereal day**. There are 366½ sidereal days in a year, and the sidereal day, that is the length of time of an actual revolution of the earth on its axis, is about four minutes less than an ordinary day.

As there is always one-half of the earth's surface lit up by the sun and one-half in the shadow of the lit part, every place on the earth's surface is half the year in the light and half the year in the shade; but the effect of the inclination of the plane of the Equator to the plane of the Ecliptic is so to distribute the light that as we go from the Equator to the poles the days in the summer grow longer and longer. At the poles themselves there are six months during which the sun never rises above the horizon and six months during which it never sinks below it.

The difference in the lengths of the days in summer and winter in the parts between the two Tropics is so slight that it need hardly be considered. At the Equator itself they are equal throughout the year.

When it is remembered that the sun's course takes it seemingly 23½° north of the Equator in the northern summer, and 23½° south of the Equator in the southern summer, it will be seen that the difference of the angle at which the sun's rays fall at midsummer and at midwinter at the Tropics and at the places between the Tropics and the poles is no less than 47°. To dwellers on the Arctic and Antarctic Circles, the sun never rises at midwinter, and never sets at midsummer.

### The Seasons

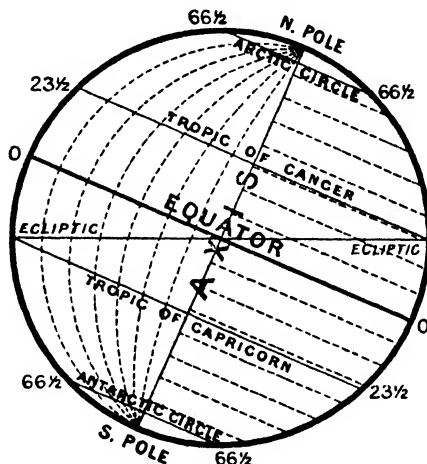
To the apparent movement of the sun in the Ecliptic, due to the angle at which the plane of the Equator is inclined to the plane of the Ecliptic, the seasons are to be traced.

In the equatorial parts of the Tropics only two seasons are recognized, the **wet** and the **dry**; but outside the Tropics, save in the monsoon lands, there are usually four well-marked seasons: **spring**, **summer**, **autumn**, and **winter**. People are not perfectly agreed as to when the different seasons begin and end. In Great Britain, March, April, and May are usually recognized as the spring months; June, July, and August as the summer months; September, October, and November as the autumn months; and December, January, and February as the winter months.

By some people February, March, and April are reckoned the spring months; May, June, and July the summer months; August, September

and October the autumn months; and November, December, and January the winter months.

There is another and more exact way of reckoning the seasons. According to this method, spring is supposed to extend from the Vernal Equinox (March 21st) to the Summer Solstice (June 22nd); summer from the Summer Solstice to the Autumn Equinox (September 22nd); autumn from the Autumnal Equinox to the Winter Solstice (December 22nd); and winter from December 22nd to March 21st. This method has the drawback that it does not reckon by even months.



Mathematical Divisions of the Earth. The dotted lines on the left indicate the direction of meridians; those on the right, parallels of latitude

**Summer** is the warmest season of the year, because then the sun is more nearly overhead and its rays fall more perpendicularly on the ground, and therefore heat it more.

There are three reasons for this: (1) the sun's rays are more concentrated when they fall perpendicularly than when they fall aslant, that is a greater number of them fall upon a given area; (2) the rays have to pass through a less thickness of air, and therefore less of their heat is lost in warming the air; (3) the rays fall much longer on the place during the summer than during the winter.

Solid bodies like rock or sand or earth are much more quickly heated by the sun's rays than liquid bodies like air or water vapour or water, and when heated they warm the air immediately in contact with them.

The chief cause, therefore, of the increased temperature in

summer is that the sun shines then for a longer time each day than it does in winter; so that it not only gives more heat to the parts beneath, but the heat is kept up for a longer time than during the other seasons of the year.

From the Equinox to the Summer Solstice the heating power of the sun and the number of hours during which it puts it forth steadily increase. The land therefore receives, both before the Summer Solstice and for some time after it, more heat from the sun than it loses by radiation during the short night. So the heat accumulates, and we find in the Northern Hemisphere that July is the warmest month.

As the period between the Vernal Equinox and the Summer Solstice is one of increase of temperature, so the period between the Summer Solstice and the Autumnal Equinox is one of decrease. It must be remembered, however, that in the Northern Hemisphere it is much warmer on the 22nd of September than it is on the 21st of March, though at both times the amount of heat received from the sun must be about equal. The reason for the difference in temperature is that all the heat received from the sun during the northern spring and summer has not been lost by radiation, but part of it remains in the earth to increase the temperature in September.



Climatic Belts

The fact that in the southern summer the earth is nearer the sun than it is in the northern summer

makes the heat of summer in the Southern Hemisphere greater than in the Northern, though the increase in heat does not make up for the shorter duration of the southern summer.

### Divisions of the Earth's Surface

The earth, like the other planets, moves round the sun in a path, called its **orbit**, which is not quite circular. The orbit forms an **ellipse** in one of the foci of which the sun is situated. An ellipse, it must be remembered, is a curved line the distance of every point of which from two fixed points within the curve, never varies. Whatever point we take on the circumference,

if we draw from it two straight lines, one to each of the two fixed points, the combined length of the two lines will be the same as the length of the two lines drawn from any other point on the circumference to the same points. The fixed points are the foci. The distance of the earth from the sun is different, therefore, at different seasons. At present it is farthest away from the sun during the northern summer, and nearest to the sun during the northern winter. When it is farthest away from the sun it is said to be in **aphelion**; when it is nearest the sun it is said to be in **perihelion**. Now, according to the law to which the motion of planets round the sun conforms, the earth moves more rapidly when in perihelion than when in aphelion. It must do so to fulfil the condition that the line joining the centre of the planet to the centre of the sun traces out equal areas in equal times.

The diagram here given will illustrate what is meant. The ellipse represents the earth's orbit,  $s$  the position of the sun in one of the foci of the ellipse, and  $MM^1$ , &c., the position of the earth. It will be easily seen that when the earth is in perihelion, that is when it is nearest to the sun, the line joining the centres of the earth and sun must travel more quickly, that is the earth must travel over a larger part of its orbit in a given time, than when the earth is in aphelion or farthest away from the sun, otherwise the line cannot trace out equal areas in equal times.

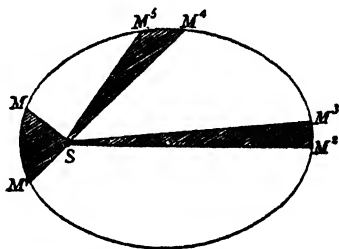


Diagram illustrating Kepler's Law

The area  $sMM^1$  is supposed equal to the area  $sM^2M^3$  and to the area  $sM^4M^5$ , so it is evident that  $MM^1$ , that is the part of the orbit traversed in given time, must be the greatest, and  $M^2M^3$  the least.

The importance of the fact that the earth travels more quickly round the sun when in perihelion than when in aphelion lies in the fact that it makes the sun at present remain longer in the Northern Hemisphere than in the Southern. From the 21st of March to the 22nd or 23rd of September is longer by seven or eight days than from 22nd or 23rd of September to the 21st of March.



The effect of this is so important that it must be carefully kept in mind. There are other causes that must be taken into account, but this is the most important of the reasons for the Northern Hemisphere being, on the whole, warmer than the Southern. At present it receives in the course of a year, fully 170 hours more light and heat from the sun than the Southern Hemisphere does. Of course during the summer, when so much of it is lit up, it is farther away from the sun than it is during the winter, or when the Southern Hemisphere is most fully lit up; but this does not balance the difference caused by the greater number of hours of sunshine in the Northern Hemisphere. So the Northern Hemisphere receives more of the sun's heat and light than the Southern does, and is consequently warmer.

The apparent motion of the sun in the Ecliptic, and the difference in the amount of heat received by different parts of the surface at different seasons, very soon led men to distinguish parts of the earth as warm, moderately warm or temperate, and cold.

The parts on both sides of the Equator on which the sun's rays fall most nearly perpendicular throughout the year, and on which on one day or two days they actually do fall perpendicularly, are spoken of as the **Torrid Zone** or the **Tropics**. Beyond the Tropics there are two belts which grow gradually colder towards the poles. These are called the **North Temperate Zone** and the **South Temperate Zone**. Round each pole there is a cap, where the cold is very great, where on one day at least during the winter the sun never rises. These two caps round the north pole and round the south pole are called respectively the **North Frigid Zone** and the **South Frigid Zone**. The picture on page 16 of a model of the globe will show the various zones and their relative positions.

### Latitude and Longitude

The position of places on the surface of the earth is described in terms of **latitude** and **longitude**.

**Latitude** is the distance of a place north or south of the Equator, measured in degrees, or it may be better described as the angle which the perpendicular to the horizontal of any place makes with the plane of the Equator.

At the north pole a person would have the pole star right overhead, or in the zenith, that is it would make an angle of  $90^\circ$  with the plane of the horizon. If he went towards the Equator the angle would grow smaller and smaller, until at the Equator the pole star would be just on the horizon. From this it is clear that the elevation of the pole star above the horizon is equal to the latitude of the place.

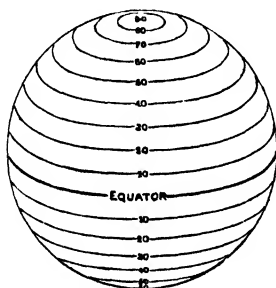
By a similar reference with respect to a fixed star towards

which the southern pole of the earth points, the latitude of a place south of the Equator can be determined.

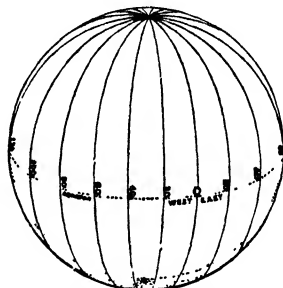
The Equator, which is the first of the lines of latitude, may be described as a great circle drawn round the earth midway between the north and the south poles.

By a great circle is meant the boundary line of a plane which divides the earth into two hemispheres, or, in other words, passes through the centre of the earth.

Lines of latitude north and south of the Equator are not great circles.



Globe, with Parallels of Latitude



Globe, with Lines of Longitude

As you will see from examining them on the globe, they grow smaller and smaller as they approach the poles.

**Longitude**, the name of the other relation by means of which the position of places on the earth is determined, is in theory even more easily fixed than latitude.

The earth turns round on its axis once in twenty-four hours, which means that we divide the time that elapses from noon on one day to noon on the next into twenty-four equal parts. If a line were drawn from pole to pole on the illuminated part of the globe, dividing it into two equal parts, all the places on such a line would have their midday at the same time, and the line itself would be called a meridian. Now the longitude of a place may be best described as the distance of a place east or west of a given meridian. The meridian passing through Greenwich, near London, is taken as that to which other meridians are referred.

As the earth turns round at a uniform rate from west to east, it is plain that as we go west the noon of places to which we come will be later and later, and that as we go east the noon of places will be earlier and earlier. If, then, we can find the local time or noon and

compare it with the time at **Greenwich**, we will be able to tell whether the place is east or west of Greenwich, and how far east or west it is. The local time is got by observing the sun's meridian passage, and Greenwich time is got from a chronometer which is carefully regulated. There are various ways in which the correctness or otherwise of the chronometer can be determined, and the true time at Greenwich fixed.

As the complete rotation of the earth on its axis takes twenty-four hours, and a complete circle is divided into 360 equal parts, or degrees, it is clear that a difference of an hour in time means a difference of fifteen degrees in longitude; if the local time be earlier than Greenwich time, it is east longitude, and if later than Greenwich time, west longitude. The lines of longitude are great circles passing through the poles and at right angles to the Equator.

The Equator and the meridians are not of course the only great circles that can be drawn on the surface of the earth. An infinite number of such circles could be drawn; the important point regarding them being that the line forming such a great circle is the shortest distance between the places through which it passes. This is a fact which the maps or plans of the world's surface and of parts of it, which we use, serve to hide.

### The Compass

Suppose a person starting on a journey from a fixed place wishes to keep a record of the way he has gone, so that he may return by it, or may, if he wishes, retrace the way at another time, he will be able to do so if he notes carefully the direction in which he walked, the distance walked in that particular direction, the changes of direction, and the distances walked in each of the new directions.

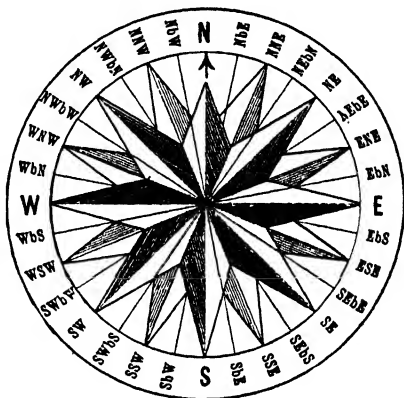
This method of procedure is called traversing, and is exactly the same as the method followed by sailors. In making such a traverse two instruments are needed, one for showing the direction, and one for measuring the length travelled in each direction. The first of these is the most important. The earth is a great magnet, and so acts on a needle suspended and left free to move that it assumes a north-and-south position. The needle does not take a true geographical north-and-south position but diverges from it, making an angle, called the magnetic variation or declination, with the true north-and-south line through the place.

The needle is mounted on a card or "fly" which it carries

round with it, and which is divided into points and degrees so as to show the extent of any change in direction.

The card is divided into thirty-two points, and these are further subdivided into degrees, which are marked along the rim of the card.

Having noted the direction in which it is proposed to travel, and proceeded along this till a bend or change of direction is made, new bearings are taken by the compass, the new direction is fixed and followed as before, till another change of direction is necessary, the distance is measured and noted, and again the bearings are taken, the new direction fixed and noted; and this process is repeated till the journey's end is reached.



Compass Card

The needle which carries the graded card is pivoted on an upright pin passing through the bottom of a heavy box or bowl, which is hung in such a way that as it swings under the action of gravity the card always comes to the horizontal position. It is perfectly clear that with such an instrument, and an instrument for measuring the distances traversed, a plan or map of the road may be made.

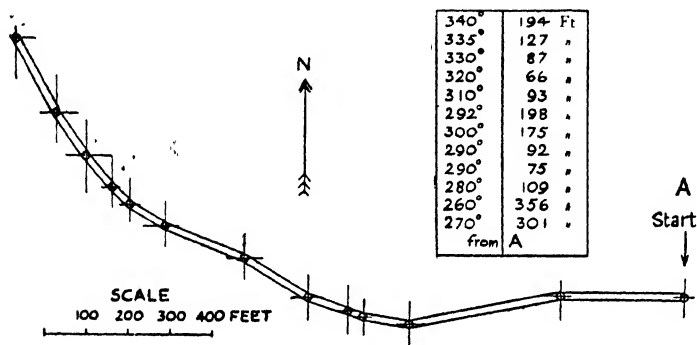
### Method for Traversing a Road

The following shows a road which has been traversed, and describes how it is done:—

Take the point on the diagram, page 22, where it says *start*. At the first two small circles, poles have been set up. One observer, standing at the first, sights the second pole, and gets the angle  $270^\circ$ ; the distance is also chained off, and is found to be 301 feet. The results are entered in the field book as shown, and the observers proceed in this way from pole to pole. It is best to arrange the poles at the end of each long piece of straight road as far off as the eye can reach. The results should be drawn out as shown, the points of the compass indicated, and the scale placed on the drawing or plan of the road.

## GENERAL GEOGRAPHY

The compass can be used to find the bearings and the position of objects and points on both sides of the route traversed; and thus in a way to provide a plan of the district through which the route leads. As a rule, in making a **map** or plan of a large district, a survey is made in the following way: A base-line is measured with the utmost care, and then by means of this base-line, using a **plane-table** or more commonly a **theodolite**, the positions of all the places it is intended to show are



fixed by a series of triangles the sides of which can be determined theoretically from the original base-line. The correctness of the calculations and of the observations are tested by actual measurement of the sides of the triangles.

## Maps

One of the chief objects of a map is to enable the user to ascertain the relative position and the distances between points and places on it, but the map should also give a clear idea of the character of the surface of that part of the earth of which it is a map.

To get a correct idea of the surface of the world on which we live, and of the relative sizes of the various parts of it, we must have these represented on a globe—the larger the globe the better and more vivid the idea to be got. Instead of a globe, we have, as a rule, in our geographical studies to employ plans or maps. It is not possible to represent a globular surface on the flat with absolute correctness. If

you take half a ball and suppose the flat part of it laid on a blackboard or other flat surface, and try to mark on the flat the position of points on the round surface, you will at once see how impossible it is to convey on the flat right ideas of the relative distances of places on the round surface. Suppose you try the simple plan of dropping lines perpendicularly from the points on the round surface to the blackboard, you will see that while distances on the surface near the middle are represented by not very different distances on the flat, near the out edges of the hemisphere the distances are crowded closer and closer together, and surface distances on the round are represented by smaller and smaller distances on the flat. This is an example of one of the plans employed to represent a spherical surface on the flat and is called a **projection**.

### Projections

There are various ways in which the spherical surface may be projected or thrown as a shadow on the flat surface; and these different ways are used for making maps for different purposes.

One projection is employed to produce a map to serve for one purpose, and another projection to produce a map for a different purpose.

A **projection** therefore means simply the shadow that the part would throw on a flat surface under the stated conditions. As the surface to be represented or projected is never flat, it is clear that the *representation*, the *plan* or *shadow* projected, can never be perfectly faithful.

The following are the chief forms of projection: (1) The **orthographic projection**, in which the *lines of latitude* appear as parallel straight lines, and those of *longitude* as the converging semicircumferences of ellipses. This form shows how the world, or a part of it, would appear in a photograph taken at right angles to the earth's axis and at a very great distance.

(2) The **stereographic projection**, in which one hemisphere is represented as it would be seen by an eye placed at the middle point of the other hemisphere when projected on the plane separating the two hemispheres. In this the lines of *latitude* and the *meridians* appear as curved lines cutting each other at right angles.

(3) The **globular projection**, in which the lines of *longitude* are arcs of circles passing through the poles, and dividing the Equator—represented as a straight line—into equal parts, and

the parallels of latitude are arcs of circles dividing the central meridian—which is a straight line and cuts the Equator at right angles—and the circumference of the circle into equal parts. This is a simple and effective projection, and preserves the symmetry better than the **stereographic**, the projection mostly used in atlases.

(4) The **conical projection** is of special use for maps of portions of the world of no great size. A cone the axis of which coincides with the axis of the globe is imagined to touch the globe at the middle parallel of the part to be mapped, and the shadow or plan of the part is supposed to be projected on this cone. Then on cutting the cone down the central meridian, and unfolding it, we have a map of the part which is correct along the parallel touched, and less and less correct as we go north or south from this parallel.

(5) **Mercator's projection** is of considerable importance because it is the projection used for making *charts* for use at sea. It is so used because the *maps* or *charts* constructed on this plan preserve the shape and show the true direction of one place from another. In this projection, while the meridians are straight lines at equal distances from each other and at right angles to the Equator and to the parallels of latitude, the parallels of latitude are, like the lines of longitude, represented by straight lines; but while the distance between the lines of longitude remains constant, the distance between the lines of latitude increases according to a regular law from the Equator towards the pole.

(6) The **elliptical equal-area projection**, also called the **Mollweide projection**, is often used to show the entire surface of the globe. In this projection the correct size of the part represented is shown, though not the shape.

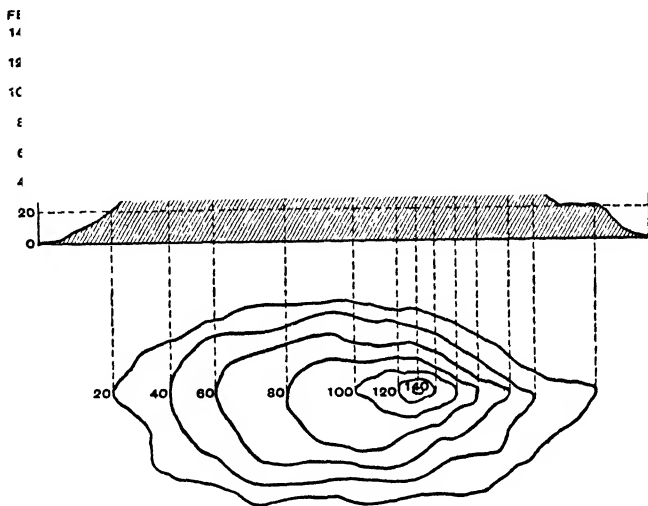
## MAP READING

### Contours, &c.

Maps, besides showing the relative position of different places on the surface of the earth, should also show the character or relief of the surface itself. This they can do by means of lines

called **contour lines**. Contour lines are lines passing through all points on the surface that are at the same height above sea level.

The height of points is found by **levelling**. A number of points at the same height are marked on the map, and through these the



Contour and Section

contour line is drawn. If the distance between the contour lines or heights is small, a very good idea can be got from them of the character of the surface. Clearly when the contour lines come closely together, the distance between one level and another is very small and the surface of the country rises rapidly. When, on the other hand, the distance between one contour line and another is a considerable one, the rise is gentle. The diagram here given of contour lines, and of the section of the hill in one direction and the configuration they represent, will help to make this plain.

## LAND FORMS

If you imagined all the seas removed from your globe, and the part beneath the ocean modelled so as to show the inequalities of the surface, you would get a fairly correct idea of



what the outside of the solid earth is like. It would then be clear to you that the earth in wrinkling forms heights and hollows of a great variety of shapes. You would see that all round the separate land masses there is a portion that was formerly under the sea varying in breadth and sloping down very gently from the land. This is the **continental shelf**, and beyond it you would notice that the surface sinks down rapidly to a depth of from 1000 to 2000 fathoms. The shelf forms really a part of the adjacent land mass or continent, and is merely a continuation under the sea of the **coastal plain**.

The inequalities of the surface of the dry land are very great, and the forms assumed by parts of the land very numerous. Such forms are not due merely, as you must remember, to the wrinkling of the crust or outside of the solid earth however caused. This fixes, we may assume, what may be called the **primary features**. We have to consider in addition the forms derived from the primary, the **secondary forms**. Moving air and moving water in some of its shapes, and changes of temperature, are all at work grinding down and chiselling the wrinkles and the sharp edges of the torn rocks into softer and more lovely shapes.

This process of earth sculpture goes on ceaselessly. The rocks of which the crust is formed have been made for the most part of material got from the destruction of previous rocks, and have been laid down in beds or layers one above the other, and are spoken of as **stratified rocks**. The original rocks of the earth's crust are of two kinds—basic, like **basalt**, formed near the surface; and acid, like **granite**, formed at considerable depths beneath the surface. The basic rocks are often spoken of as **volcanic** or **extrusive**. The liquid matter from which they are formed has cooled rapidly, and in cooling shows on the surface a more or less slaggy or cindery appearance, and is often of a spongy texture.

The acid rocks, known also as **plutonic**, are always entirely crystalline, and are often very coarse in the grain. They are much harder, and do not therefore break up so readily as the volcanic rocks. They are largely of quartz. In breaking up they form coarse, sandy soils, not usually fertile.

There are two things to be remembered with regard to **crystalline rocks**: (a) Their hardness, that is, their power of resisting the forces that break up rocks. On this account the soil formed over these rocks by the weathering of their surface is usually very thin. (b) The soil these rocks form is not rich in plant-food, that is, it is not fertile.

The **volcanic rocks**, on breaking up, form soils remarkable for their

fertility. Thus the **black cotton** soil of the Deccan is one of the most fertile in India.

### Classification of Land Forms

Land forms are arranged according to their extent and to their height above sea-level. In the latter arrangement the contour lines on the map are followed.

If a considerable stretch of country is fairly level, and nowhere rises to a height of more than a few hundred feet above the sea, we speak of it as a **lowland plain**. Stretches of level or comparatively level country lying from 600 to 2000 feet above sea level are usually described as **upland plains**, and above that height they are spoken of as **highlands** or **tablelands**. These again are subdivided according to their height into **lofty tablelands** and **low tablelands**. Plains are spoken of also as **coastal plains** and **inland plains**. Coastal plains lie along the edges of the continents or land masses, and have been formed in the water by the deposition on the continental shelf of materials brought from the interior. Afterwards, by the raising of the shelf or the sinking of the sea, the plains so formed have been lifted above the level of the water.

Some interior plains were at one time coastal plains.

Not infrequently the plain rises to the plateau, or the tableland sinks to the plain, by a steep ascent or descent called a **scarp** or **escarpment** or **cliff**.

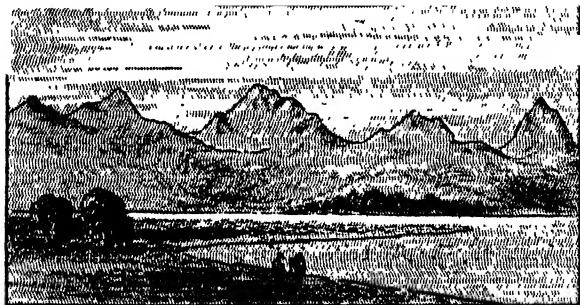
### Plains and Departures from Plains

Plains are called by different names in different parts of the world. Such names usually show more or less clearly the kind of plain meant, that is, they show what the plains produce, or what grows on them. Thus we have the **steppes**, or dry grassy plains of Western Asia and Eastern Europe, the **prairies** of North America, the **savannas** of Sub-tropical, Tropical, and Central America, and the **llanos**, **campos**, and **selvas** of South America.

The departure from the plain may be upward or downward. When a part of the surface rises to a considerable height (2000 feet or more) above the surrounding district we call it a **mountain**. Professor James Geikie grouped mountains into **mountains of accumulation**, **mountains of elevation**, and **mountains of circumdenudation**. The accumulated mountains naturally include volcanic hills, geyser mounds, and moraines or ice deposits. Elevation mountains are produced by the bending, and often by the breaking, of the earth's crust, part of which has been forced up by pressure against another part. Mountains of circumdenudation are mountains due to the action

of water or air in carrying off the softer or more friable parts of the surface. A number of mountains in a line, connected by high ground, forms a **range** or **chain**, the depressions between the peaks are known as **passes**, and where the depression comes between two ranges or between two branches of a mountain system it forms a **valley**.

Valleys are long narrow depressions lying between the opposite slopes of hills or of mountain ranges, and having usually a river



A Mountain Chain

flowing through their lowest part. When the hollow between the opposing sides of the mountains is narrow it is spoken of as a **ravine**, sometimes as a **gorge**. When a hollow slopes in all directions towards a central part it is spoken of as a **basin**.

The name basin is used with certain appropriateness for the part of the country drained by a river, and also for the area or part of the world that sends its surplus water into a particular lake, sea, or ocean.

Sometimes valleys, hills, and even mountain ranges have been formed from what was at one time a level part by the water or wind carrying away the softer parts and leaving the harder or more resisting parts standing. Where this has happened, the region is spoken of as a **dissected plateau**. Such regions are very numerous. The plateau of MALWA, in Central India, indeed the whole of Central India, is a good example of a **dissected plateau**.

Such dissected plateaus often give rise to mountain groups rather than ranges. Of these mountain groups we have excellent examples in the **Highlands of Scotland** and in the **Lake District of England**, or

in the **Vindhya and Satpura Hills** of Central India, and the **Pamirs of Central Asia**. In some cases the plateau has been so completely worn down that it has been reduced almost to a plain, and is spoken of as a **penepplain**.

There is a constant washing away of the solid land by the action of air and water and of heat and cold. Under these forces, which are called **denudation** or **erosion** forces, the dry land is bit by bit crumbling away and being brought down to the level of the sea.

Of course the softer parts are first removed, or, as it is said, they waste or weather more rapidly than the harder parts; but the irregularities formed by the wasting are removed later. The whole land surface of the world would therefore be reduced to a plain were it not that other forces are at work to balance the forces of denudation.

Forms are grouped sometimes according to the length of time that the denudation forces have been at work. A river is spoken of as **young** or **new** when there are inequalities in the channel, like waterfalls, and as **old** when it has smoothed its channel down to a general slope. Mountains which still keep their sharp and broken outlines, like the Himalayas and the Rocky Mountains, are called **new**, while those that have had their edges worn down and have become comparatively smooth, like the Nilgiris, are said to be **old**.

## GENERAL RELIEF OF THE GLOBE

Look at a globe showing the surface of the world in relief, and you will see that there is much more land in the Northern Hemisphere than in the Southern, and that the land increases in breadth as we go from south to north.

So true is this, that along the seventieth parallel of north latitude, save for the passage from the Arctic Ocean into the Atlantic between Norway and Greenland on the west, and the much narrower passage between Asia and America on the east, the land goes right round the world. In the Southern Hemisphere the ocean actually passes completely round the world along the sixtieth parallel of south latitude.

An examination of the shape of the great land masses on the globe makes it clear: (1) that they are roughly **triangular**; (2) that they increase in breadth as we go towards the north; and (3) that they end towards the south in a point or cape.

This is manifestly the case with South America, North America, and Africa, and less clearly so with Eurasia and Australia, while with

regard to Antarctica, the land round the south pole, it is as yet impossible to speak with any certainty. This ending of the land masses in a point towards the south, and their widening out towards the north, is a fact that can be readily remembered.

### The Great Slopes

Besides the triangular outline of the land masses, especially if we include with these, their continental shelves, there is another point that an examination of the relief model of the earth will bring out, namely, the difference in direction of the arrangement of the outstanding physical features in the New World and in the Old.

\* The largest body of high ground in Eurasia, the **Alpine-Himalayan system**, runs from east to west. It stretches from the shores of the Atlantic to the China Sea, and consists of parallel chains of folded mountains of geologically recent formation.

In some parts the breadth of the system is very great; in others, while the main axis runs from east to west, **dependent loops**, forming peninsulas or enclosing secondary tablelands, stretch southward from the main chain. The Alpine-Himalayan system is the most outstanding physical feature of the land surface of the globe. It contains also the parts of the earth's surface that rise highest above sea level. The highest point of all, Mount Everest in the Himalayas, is fully five and a half miles high. In addition it includes the most extensive and the highest tablelands in the world, the tablelands of **Tibet**, Iran, and the Pamirs.

The corresponding chain of mountains in the New World runs from north to south, not very far from the western edge of the continental shelf. Like the Alpine-Himalayan system this **Rocky-Andean** system consists of parallel chains of folded mountains, enclosing between them elevated tracts or plateaus of varying breadth. Like the mountain system of the Old World, too, it is of comparatively recent formation.

The Rocky-Andean system is nowhere so high, nor are the plateaus which it includes anywhere so lofty or extensive as those of the Old World. It is also, as you will see, broken into three distinct parts by a depression at the Isthmus of Tehuantepec, which separates North America from Central America, and by another, which separates Central and South America, and through which the people of the United States have made the **Panama Canal**.

The **Caribbean Sea** and the canal by which it is joined to the Pacific form part of what may be called a **Mid-world Depression**, which is of very great 'geographical interest.

If you follow the Mid-world Depression eastward across the Atlantic to the west coast of Africa, you will notice that on the west coast of Africa there is a stretch of low-lying land running north-east from near Cape Blanco to the Gulf of Gabon. Part of this is known as **El Gidi**, or the Dunes, and part as **El Erg**, though **El Juf**, the West African depression, also belongs to it. It runs south of the Atlas Highlands, which form really a detached part of the Himalayan-Alpine system.

This depression may be followed along the north coast of Africa, across the Levant to the south of Cyprus, through Syria, down the valley of the Euphrates and Tigris to the Persian Gulf, across the Arabian Sea, up the valley of the Indus, down that of the Ganges, and along the east of the Bay of Bengal to the Pacific Ocean. By cutting the Suez and Panama Canals a waterway mainly along the line of this depression has been opened up round the world.

### Northern and Southern Land Masses

If the parts of the world to the north and the parts to the south of the Mid-world Depression be compared, it will be seen that there is, as far as the Old World is concerned, a great difference in form between the land on one side of this Mid-world Depression and the land on the other side.

North of the central depression are the land masses of **Eurasia** and **North America**. **Eurasia** consists of the southern girdle of folded mountains of recent formation, enclosing in their branches and loops enormous stretches of tableland, and to the north of this of a much older system of **block mountains**. This system runs almost parallel to the Alpine-Himalayan fold mountains, and bounds on the south a vast plain which slopes to the Arctic Ocean. To the north-west and north-east of the Alpine-Himalayan and of parallel block mountains, **Primary mountains** spread out so as to cover the larger part of north-western Europe and of north-eastern Asia. These were at one time, it is supposed, parts of distinct continents, though now they form parts of the single land mass Eurasia.

The vast plain to the north occupies a fairly large portion of the land mass of Eurasia.

**North America** consists of a central plain with an older mountain region to the east of it and a newer mountain region to the west.

South of the Mid-world Depression are the continents of South America and Africa, the peninsulas of Arabia and India, and the great island continent of Australia. These are all to a great extent built on similar lines. They form plateaus or tablelands of very old and mostly horizontally arranged rocks, descending to the sea by terraces or by scarps sometimes of great steepness.

The coasts of these southern parts of the land have few openings in them, and the courses of the rivers that flow over them are broken by rapids where they descend from the tablelands to the sea. For the most part also the rivers flow in deep gorges, and this makes it hard to use them for irrigation purposes.

Rivers that have not worn down their channels to a steady slope, but have waterfalls on their courses, are said to be young; yet the Deccan, Australia, and Africa are parts of the land that have been very long above the sea, and in all of these there are magnificent waterfalls on the rivers where they descend from the tableland to the coastal plain. In India the most beautiful of these waterfalls are on the **Mahanadi** and the **Godavari** as they break through the Eastern Ghats, that is, fall over the eastern escarpment or edge of the tableland. The most remarkable waterfall in India, however, is the **Jog Falls** or **Gersoppa Falls**, on the Sharavati river, on the Bombay-Mysore frontier. There the river hurls itself over a cliff 830 feet high in four separate cascades.

### The Great Oceans

The water surface, unlike the land surface, is continuous. Its arrangement over the globe is far from uniform. Water forms only 61 per cent of the surface of the Northern Hemisphere, while it forms 81 per cent of the surface of the Southern Hemisphere. The land masses break up the water into parts known as **oceans**, each called by a distinct name.

There are five of these great divisions of water cut off from each other more or less by the land masses. The vast ocean between Asia and Australia on the one side and North and South America on the other is sometimes spoken of as the **Pacific Ocean**, sometimes as the **Southern Sea**, and sometimes as **The Great Ocean**. It covers more than one-third of the whole surface of the world, and at its widest part goes nearly half-way round the earth. It is divided by the Equator into the "Northern Pacific" and the "Southern Pacific". On the north it is joined by Bering Strait to the Arctic Ocean; but on the south it widens out so as to combine with the other oceans in forming an unbroken band of water right round the world.

The **Atlantic Ocean** is a long and comparatively narrow, or canal-shaped ocean, stretching from the north polar regions to the south polar regions. It lies between the Old World and the New, and has quite wide openings both into the Arctic and into the Antarctic Oceans. Like the Pacific it is divided by the Equator into the "North Atlantic" and the "South Atlantic".

The **Indian Ocean** has Southern Asia to the north, Australia to

the east, and Africa to the west. It is smaller than the Atlantic, and less than half the size of the Pacific. It owes its name to the fact that it washes the peninsulas of the Indian Empire on three sides. Most of the Indian Ocean lies within the Tropics, and its waters therefore are warmer than the waters of the Atlantic or the Pacific.

The **Arctic Ocean**, or, as it is now sometimes called, the **North Polar Sea**, is an almost land-locked sea lying round the North Pole. The hollow in which it lies seems very deep. It opens into the Atlantic by a comparatively broad passage and by a narrow passage, Smith's Sound and its continuation between Greenland and America, while it opens into the Pacific by the narrow Bering Straits. The Pacific, Atlantic, and Indian Oceans open out towards the south, and so form the **Antarctic Ocean**. This is the name given to the body of water which surrounds the South Polar continent Antarctica. Its boundaries are purely imaginary.

### Seas

Smaller divisions of water than the oceans are called seas. These are in some cases of very considerable size.

They have been classified as: (a) **Inland**, that is seas entirely cut off from the ocean, such as the Caspian Sea and the Sea of Aral, &c. (b) **Enclosed**, that is with only one entrance to the ocean, such as the Mediterranean, Baltic, Red Sea, &c. (c) **Partially enclosed**, that is seas joined to the ocean by various passages, such as the Caribbean Sea, China Sea, Yellow Sea, &c. (d) **Barred-off** seas, separated from the ocean by submerged ridges, such as the Coral Sea between Australia and New Guinea, the Eastern Sea east of China, and Bering Sea, &c.

### The Ocean Bed

On the globe showing the world in relief the dry land is represented as rough and the water surface as smooth.

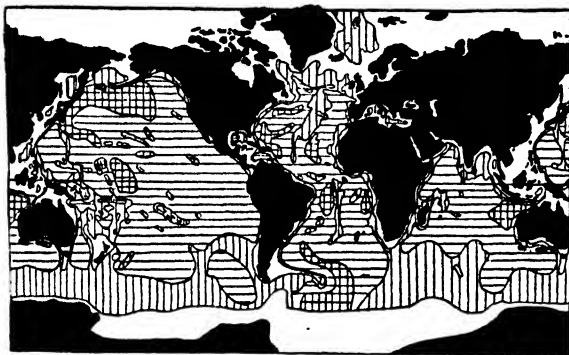
We speak of the surface of the sea as if it were flat or level, and of places on the dry land as being raised so far above sea level. Of course the sea is not actually flat, but is curved. Theoretically we would call it flat if all parts of its surface were at the same distance from the earth's centre. Even this cannot be said of the seemingly level surface of the sea. The parts of the sea nearer the land are attracted by the land masses, the mean density of these being rather more than two and a half times the density of water, so that the water close to the land is piled up, or stands considerably higher than the parts in mid ocean. For all our purposes, however, we may think of the surface of the sea as level.

At the seaside, as the rising and falling tide lays bare part of the bed or bottom of the sea, the observer finds that the land surface under the water is uneven, though not quite so uneven as the neighbouring dry land. By taking soundings, that is, by finding the depth of the ocean floor at ascertained distances from the shore, the inequalities of the bed of the sea can be marked, and the contours shown as in the case of the



dry land. From the many soundings taken all over the world it has been concluded that the mean distance of the ocean floor below the surface is about two and a half miles. The average depth of the sea, therefore, is about five and a half times the average height of the land, which is rather less than half a mile.

On the whole the bed of the ocean is smooth, and there are great stretches of it that seem nearly level, but there are heights and hollows of the sea floor just as there are of the dry land. The surface of the



Ocean Contours

White space bordering lands, shallow waters up to 1000 fathoms; vertical lines, 1000 to 2000 fathoms; horizontal lines, 2000 to 3000 fathoms; squares, 3000 to 4000 fathoms; fine cross, over 4000 fathoms.

floor of the sea has been stated to resemble that of the land if the latter were inverted; and just as in most parts in the new folded system of mountains that run near the sea the greatest land heights lie along the edge of the land, so in the case of the sea the greatest depths seem to occur near the edge of the sea, close to the land masses.

### The Continental Shelf

The continental shelf is the gentle slope of varying breadth which surrounds the land masses, and stretches out from them for a greater or less distance at a depth varying from a few to 200 fathoms. The continental shelf everywhere gives place to a slope which descends rapidly, in some cases, to abysmal depths.

The depressions in the sea are known by the various names of **basins, troughs, and trenches**, according to their shape, and the elevations as **risers, ridges, and plateaus**. The names explain themselves, as do the names of minor forms like **caldron, furrow, shoal, &c.**

## TIDES

For several hours daily the water of the sea seems gradually to rise along the shore, becoming in some cases several feet deeper; and for several hours daily it gradually sinks back till it reaches its former level. This alternate rising and falling of the water is known as the **flow** and the **ebb** of the **tide**.

Though the water rises and falls nearly twice daily, it does not rise and fall to the same extent each time. It was observed very early that the times when the water rose highest, the **spring tides**, corresponded to or followed shortly after the new moon and the full moon, and that the times when the tides were lowest, the **neap tides**, corresponded to or followed closely after the moon was in quarter. It was clear from these observations that the tides in some way were connected with the moon and its revolutions.

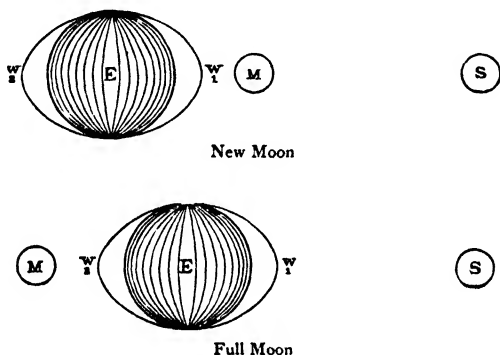
All bodies attract or draw to themselves other bodies with a force which is **directly** in proportion to their **mass** and **inversely** in proportion to the square of the distance at which they act. For the purpose of estimating the attraction we must suppose bodies like the sun, the moon, and the earth to act as if they were simply centres of force acting from their centres.

The moon is 240,000 miles away from the earth, while the average distance of the sun is estimated at over 90,000,000 miles, or nearly 400 times more; so that if the moon and sun were of equal size, the attraction of the moon would be 160,000 times the attraction of the sun. The sun, however, is 30,000,000 times bigger than the moon, and if we divide 30,000,000 by 160,000, we get in round numbers 200, which shows how many times greater the sun's attractive force on the earth is than the moon's.

Both the sun and the moon draw towards them the water on the side of the earth next to them with a greater force than they draw the earth, because the water is 4000 miles nearer than the earth itself; and they draw the earth towards them with a greater force than they draw the water on the opposite side of the earth, because the earth is nearer than the water; so the water is piled up under the sun and the moon both on the side nearest to them, and on the side farthest away from them.

When both the sun and the moon pull in the same direction,

or in exactly opposite directions, that is, at the **new moon** or at the **full moon**, then the water is piled up more highly under them, and we have what are called **spring tides**. When the sun and the moon pull at right angles to each other, then they have a weaker pull, as they partly balance each other, and the piling up of the waters under the moon on the side nearest to it and on the side opposite to it is less, or the resulting tides are lower, and are spoken of as **neap tides**. As spring tides occur when the sun and moon are in conjunction or opposition,



that is, at the new and at the full moon, so **neap tides** occur when the moon is in quadrature, or at the quarters.

The force with which the moon **draws** the water under it to itself is as much greater than the force with which it draws the earth, as 244,000 square is greater than 240,000 square. This will be found to be approximately as 31 is greater than 30; that is, the force with which the moon **draws** the water is one-thirtieth more than the force with which it draws the earth. By calculating in a like way the relation between the pull of the sun on the water nearer to it, and its pull on the earth 4000 miles farther away, it will be found that the sun's pull on the water is one-twelve-thousandth more than its pull on the earth. Remembering that the sun's pull on the earth is 200 times greater than the moon's pull, it will be easily seen that one-thirtieth of the moon's pull is fully twice one-twelve-thousandth of the sun's

pull. The moon therefore has fully twice the effect in causing tides that the sun has.

The piling up of the water under the moon, and on the opposite side of the earth, follows the moon in its course, so that there are two high or flood tides for every revolution of the moon.

By revolution here is meant apparent revolution, that is, the time between one passage of the moon over a meridian and its next passage over it.

As the moon actually revolves round the earth in the direction in which the earth revolves on its axis, and completes its revolution in between 27 and 28 days, it takes some 24 hours 54 minutes from the time it passes a meridian till it passes over it again. The time for every two tides in most places is about 54 minutes more than 24 hours; that is, the ebb and flow of the tide take each about  $6\frac{2}{3}$  hours.

High water even in the open ocean does not take place exactly when the moon passes a meridian but always about two hours later. In the same way spring tides and neap tides do not take place at the new and full moon, and at the first and third quarters, but are in every case a day or two later.

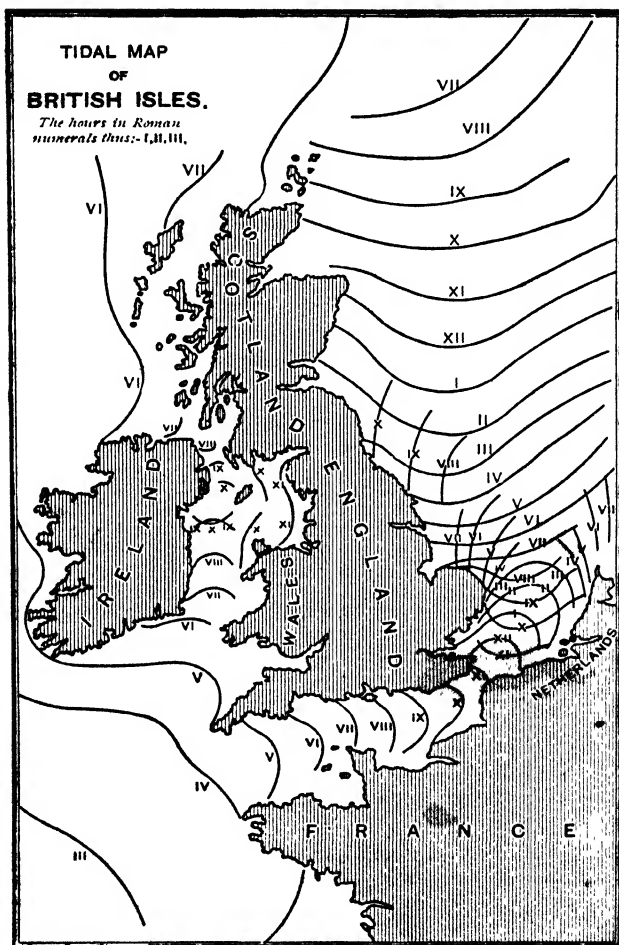
If the earth had water of the same depth all round it, the tidal wave would flow regularly round the earth twice each **lunar day**, being highest directly under the moon and decreasing towards the poles; but the land masses so interfere with the flow of the tidal wave that in some places there seems to be two tides every twelve hours, and in others only one tide in every twenty-four hours.

The true tidal wave begins in the great body of water that surrounds the earth in the Southern Hemisphere, and its course from there can be followed all over the world.

When the points at which high water occurs at the same time are joined by lines, these lines with the time of the occurrence of high water marked on them are known as **Cotidal lines**.

In mid ocean the tides show a rise of a foot or two when the crest of the tidal wave passes the meridian, and a fall to a similar extent when the trough passes six and a quarter hours later. When the wave enters shallow water it often becomes changed into a current, sometimes of very considerable strength.

The wave moves most rapidly in the open ocean, just as the water in the centre of a stream flows faster than the water nearer the banks. In the case of river mouths narrowing as they advance inland this holding back of the tidal wave by friction often leads to the phenomenon known as a **bore**. The advancing wave in the form almost of a wall



of water passes up the funnel-shaped opening forming the arm of the sea or the mouth of the river. The rise and fall of the tides on the Severn, on the Forth, and on the Wash are examples in Great Britain of the height to which the tide may rise. On the **Meghna**, in the

Ganges-Brahmaputra delta, the ordinary rise of the tides is from 10 to 20 feet, and during spring tides the bore, looking like a foam-topped wall, rushes up the stream at the rate of 15 miles an hour. In the Bay of Fundy the difference in height of the water at flood and ebb tide during spring tides is as much as 70 feet, but on most coasts the difference between high water and low water is not more than 10 feet.

In the days of sailing ships the currents set up by the tides were of considerable help in navigation, vessels entering river mouths and proceeding to harbours on the flood, and leaving them on the ebb. The scour of the tidal current also is of great help in keeping the channel near the mouths of rivers free from bars, which would obstruct the river navigation.

## OCEAN CIRCULATION

If a glass trough be filled with water and a freezing mixture be placed at one end and a heating arrangement at the other, immediately two currents will be set up—an undercurrent from the cold end to the hot and a surface current from the hot end to the cold. This is, in a way, what takes place on the earth between the Equator and the poles; but both currents are modified by the earth's rotation, the warm surface set of the surface water of the ocean is turned towards the east and is flung against the western shores of the land masses in the Northern Hemisphere, while the equatorwards cold set of the bottom waters is washed up against the eastern shores of America and Eurasia; in the Southern Hemisphere the warm current is flung against the eastern shores of the land masses and the cold current against the western. The heat of the sun, too, turns part of the surface water into vapour which is carried off by the winds but leaves behind the solid matter it held in solution. This makes the water left heavier, so that it sinks down and water from below rises to take its place. There is thus a perpendicular as well as a horizontal circulation of the waters of the ocean. The great cause, however, of what are more particularly known as **ocean currents** is the winds.

## THE OCEANS AND THEIR RELATIONS TO THE GREAT WATER PARTING

The importance of the different oceans as highways of commerce and their usefulness as channels of trade is not determined merely by their size, nor even by the extent to which arms from them penetrate the dry land that limits them. Very early the rivers that flow into the oceans become highways of trade, if they are navigable. They run far into the land, and goods are brought by them cheaply from the interior to the sea, to be shipped to lands beyond the ocean; or goods that have been brought across the sea from other lands are carried by the rivers cheaply far into the interior of the land mass.

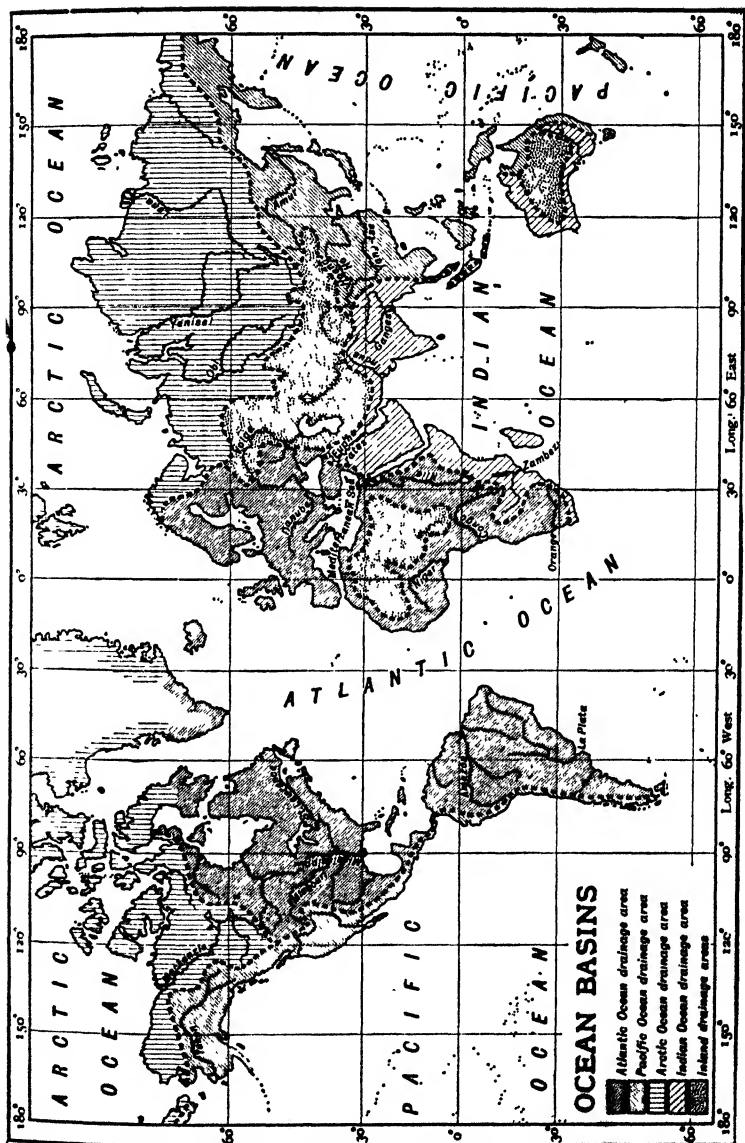
It was on the lightly wooded plains near the mouths of rivers that civilization had its origin. The earliest civilized societies seem to have been formed in Asia in the lower part of the valley of the Euphrates and Tigris, in China in the lower part of the valleys of the Yangtse Kiang and of the Hoangho, and in Africa in the lower part of the Nile valley. What civilization was native to America had its seat, it is true, in the plateaus of Mexico and Peru, and not in the great river valleys; but this seems an exception. As a rule the fertility of the soil of the river valleys, and the ease with which communication can be kept up between one part and another, have made them the homes of civilization.

In the earlier stages of human civilization the river valley and the ease with which it could be brought under permanent cultivation was of the greatest importance; but as soon as men were able to make the oceans the highways of commerce the importance of these was found to depend on the size of their basins, the number of their navigable rivers, and the use that could be made of the latter as channels of transport.

### Ocean Basins

The rivers that flow into the Atlantic and the seas that form part of it are not only the largest in the world, but are also the best suited for trade; and the basin of the Atlantic, that is the part of the dry land that sends its surplus water into the Atlantic, is actually much greater than that of any of the other oceans.

The Atlantic receives the drainage of the greater part of Europe, Africa, North America, and South America.





Of a small portion of Europe, a great part of North Asia, and a small portion of North America the rivers flow into the Arctic Ocean.

Owing to the severity of the climate in the circumpolar regions the Arctic Ocean and the rivers that flow into it are of very little commercial use. During the greater part of the year the mouths of the rivers are frozen; so goods cannot be carried by them to the sea, though between places along their courses the rivers may be of use as trade routes.

Commercially it must be remembered that rivers are mainly useful as means of communication between the interior and the coast. This, of course, by no means exhausts their usefulness. In some regions, as in India and Egypt now, as formerly in Turkey-in-Asia and in Spain, they serve to water the land, and make productive what would otherwise be desert; they are a great source of food supply, and in many instances of power which is used to propel machinery.

A large part of the interior of **Eurasia** has streams that do not reach the ocean, but fall into inland seas or lakes. The usefulness of these, therefore, as channels of trade is considerably less than it would be if they flowed into the ocean. Such a drainage stretch is spoken of as **continental**, to distinguish it from the drainage into the ocean.

Rivers of this kind must not be supposed useless. Far from such being the case they are often of the very greatest importance, and are turned to excellent account for irrigation, and even in some cases for commercial purposes. Such was the case with the rivers of Afghanistan and of Central Asia, the **Helmand**, **Murghab**, **Hari Rud**, and **Oxus**. Owing to the opportunity afforded for civilization by the Oxus, which flows into the Sea of Aral, Central Asia became in the Middle Ages the centre of one of the vastest empires the world has ever seen.

In Africa, though some of the rivers are of great length and run far back into the interior of the continent, on account of the falls that occur near their mouths their usefulness as channels of commerce is much less than would be expected.

This is due to the plateau character of the continent and to the fact that the coastal plain, save in the north-east, is comparatively narrow, and that from the plain the land rises to the interior by terraces with steep scarps. In this respect Africa and Australia are very like each other. The rivers, after flowing over the continent, descend to the coast by rapids or falls which greatly impede navigation.

The rivers of the **Deccan** are commercially of less use than

they would otherwise be, because they have to break through the hills on the edge of the plateau before reaching the coastal plain. In their upper reaches the Deccan rivers as they pass over very old rocks flow in comparatively wide and shallow channels, and can to some extent be used for irrigation; though they are of little use for traffic.

### The Continents

The world's dry land consists of five large pieces and of a great many smaller pieces. The largest piece of all is the Old World. It includes the three continents **Europe, Asia, and Africa**. Europe, a corner of Africa, and the greater part of Asia lie north of the Mid-world Depression; and the **Deccan, Arabia,** and the rest of Africa south of it.

The New World, which lies to the west of the Old World, consists of **North America, Central America, and South America**. **Australia** is an island in the Southern Hemisphere nearly as large as Europe. The plateau character of the land mass is characteristic of the land areas south of the Mid-world Depression, as is that of the eastern part of South America. The largest mass of land entirely in the Southern Hemisphere is probably **Antarctica**, with an area equal to about half the area of Africa, though at present we know too little about it to make a map of it.

**Greenland**, which has an area of about 850,000 square miles, is the fifth of the great land masses, but save its outline almost as little is known regarding it as is known regarding Antarctica.

The **Suez Canal** cuts off Africa from Eurasia, and the **Panama Canal** turns South America into an island. The great land masses of the world, therefore, that is, those whose area is more than half a million square miles, are: Eurasia, Africa, North America, South America, Antarctica, Australia, and Greenland.

### CLIMATE

In studying the geography of the world, and in dividing the earth up into "regions", considerations of climate are of the utmost importance. By climate must be understood the

sum total of the weather conditions that, on an average, prevail in a particular region.

These include, of course, the average temperature for the year; the distribution of the temperature, that is, the periods of the year and the length of time during which a particular temperature lasts; and the range of temperature, that is, the difference between the coldest and warmest hours in any one day, and the coldest and warmest days in any one year. Where the range is low the climate is said to be **insular** or **marine**, and where it is high it is said to be **continental**. The reasons for these names will be clear later.

**Climatic conditions** include, besides those already mentioned, the average annual rainfall; the number of days on which rain falls in the year; the greatest amount that falls in twenty-four hours; and the average amount that falls in each month. They include also the winds and their direction and strength; the average number of hours of sunshine and of cloudiness during the year; the degree of moisture of the atmosphere; and a number of other facts, among which the most important in its bearing on other geographical phenomena is the weight of the atmosphere itself.

All these facts regarding weather conditions of a place or region are grouped together and classed as its climate. The climate determines largely what grows in a country, what sort of animals live in it, and what is the character of the people who occupy it; what kind of things the people produce, and what sort of trade they engage in. It is for these reasons that the study of climate and what has been called climatic control is of such vast importance.

### Climatic Belts

Roughly the world, owing to its inclination to the plane of the Ecliptic, is divided into five regions, that, with respect to their climates, may be grouped together as three: (1) The **Tropics**, or parts lying within the zone or belt bounded by the parallels of latitude  $23\frac{1}{2}^{\circ}$  north and  $23\frac{1}{2}^{\circ}$  south of the Equator; (2) the **North and South Temperate Zones**, lying respectively between the Tropics and the parallels of  $66\frac{1}{2}^{\circ}$  north and  $66\frac{1}{2}^{\circ}$  south; and (3) the two cold caps, the **Arctic and Antarctic**, or the **Polar Regions**, stretching the one for  $23\frac{1}{2}^{\circ}$  round the north pole, and the other for  $23\frac{1}{2}^{\circ}$  round the south pole.

Thus, taking into consideration temperature alone, as determined by the position of places on the earth's surface, we have to suppose the

earth divided into five regions: (1) a very warm region on both sides of the Equator; (2) two temperate regions lying between the warm region and the cold region round each pole; and (3) two extremely cold regions, the north polar and south polar or arctic and antarctic regions round the north pole and the south pole respectively.

If the surface of the earth were of water, or entirely uniform, it would be found that the average temperature or degree of heat decreased steadily as we proceeded from the Equator to either pole, and that parts of the world the same distance north or south of the Equator had nearly the same average annual temperature.

There would be some difference even in that case. We know that the sun is between seven and eight days longer north of the Equator than it is south of it, so that, though the earth is more distant from the sun in the northern summer, the Northern Hemisphere gets more of the sun's heat and light during the year than the Southern does. In round numbers there are about 170 hours more day than night in the Northern Hemisphere and 170 hours more night than day in the Southern. Even if this were not so it would only be true in a general way that places are colder the farther they are from the Equator.

### **Climate in Northern and in Southern Hemispheres**

Owing to the distribution of land and water, and to the fact that the land heats up more rapidly though to a much smaller depth than the water and that it also cools more rapidly, the distribution of heat does not follow exactly the lines of the parallels of latitude. The Northern Hemisphere, which contains nearly three-fourths of the land of the globe, is everywhere warmer than the Southern in the same latitude. This is partly due to the fact that the Northern Hemisphere receives, as has been said, more of the sun's heat than the Southern Hemisphere does, but mainly to the distribution of land and water, and to the effect that distribution has on the air and water movements, that is, on the winds and on the ocean currents.

Instead of the regions of climate following the lines of latitude we find that the very warm regions, the regions where the average annual temperature is  $68^{\circ}$  F., or more than  $68^{\circ}$  F., stretch to nearly  $30^{\circ}$  north latitude and  $30^{\circ}$  south latitude, in some cases even beyond these lines. The very hot belt is wider therefore than the Torrid Zone.

The two temperate belts are bounded towards the poles by the line which passes through places having the average temperature of  $50^{\circ}$  F. for their warmest months. This line marks the polar limit of trees. July in the Northern Hemisphere and January in the Southern are the warmest months.

The line of the highest annual temperature, called on the sketch the Heat Equator, runs for the most part a good deal north of the Equator; and while the annual temperature line of  $68^{\circ}$  F., which we may reckon as marking the limits of the Tropics, runs not far from the parallels of  $30^{\circ}$  north and  $30^{\circ}$  south latitude, the North Temperate Belt is much wider than the South Temperate Belt. In the Northern Hemisphere the line going through places having a highest average monthly temperature of  $50^{\circ}$  F. passes north even of the Arctic Circle, and is only forced south of  $60^{\circ}$  north latitude in the regions of Labrador and of north-eastern Siberia. South of the Equator the isotherm of  $50^{\circ}$  F. for January, the warmest month, never reaches the sixtieth parallel of south latitude, runs generally at least 10 degrees nearer the Equator than the corresponding isotherm in the Northern Hemisphere.

The North Temperate Belt, therefore, is much broader than the South Temperate Belt, and the north cold cap much smaller than the south cold cap.

Temperature is one of the chief things to be considered in the study of climate. On differences of temperature the winds depend; and on temperature and the winds the circulation of the waters of the sea depends. This in turn modifies greatly the climate of different regions.

The Temperate Belts are divided into warm temperate or sub-tropical, cool temperate, and cold temperate.

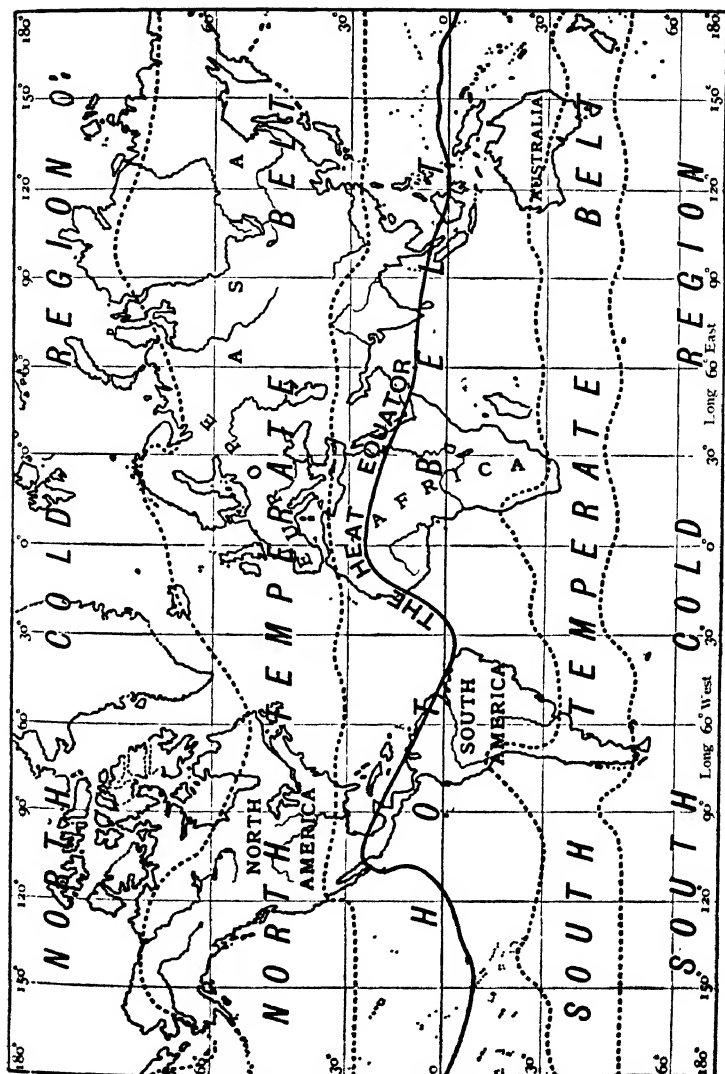
The climate of the Tropics or parts of the earth about the Equator is hot because the rays of the sun fall more directly there. Added to this, there is a great deal of land in the Tropics, especially north of the Equator.

### Climatic Conditions

The climate of a place does not depend on its latitude alone. It is greatly influenced by the nearness of the place to or by its distance from a great body of water. Water heats more slowly and cools more slowly than land. As we should expect, therefore, places in the neighbourhood of water have a climate that varies less in temperature than places surrounded by masses of land.

This is so marked a characteristic of climate that we speak of climates where the difference between the warmest and the coldest weather is slight as sea climates or **maritime climates**, and where the difference is great as land climates or **continental climates**.

**Island climates** the rainfall is usually small, and the difference between the summer and winter temperatures is great; while in sea climates the rainfall is usually large, and the difference between the



## GENERAL GEOGRAPHY

summer and winter temperatures small. The difference between the summer and winter temperatures of places increases as we go from the Equator to the poles. The summer and winter differences of temperature in the hot belts is always very small. "Night", someone has said, "is the winter of the Tropics". In the Tropics the difference between the night and the day temperatures is often much greater than the difference between the coldest day and the hottest day of the year.

Though the influence of a great body of water is of so much importance in regard to the temperature of a place, a more important factor still is the height of the place above sea level. Just as in going from the Equator to the poles we find roughly that every degree of latitude means an annual temperature one degree lower, so in climbing a hill we find the temperature decreases at the rate of 1 degree for every 250 to 300 feet we ascend.

Quito, almost on the Equator, but 9000 feet above the sea, enjoys a perpetual spring. In South Africa, though the climate of the coast region is exceedingly hot, that of the tableland is cool. It is this elevation that makes large parts of North and of South Africa fit for occupation by Europeans. Much of Abyssinia and of British East Africa are healthy only because they are so high.

Mountains in the Tropics often offer a complete climatic contrast to the lowlands, and they are used as health resorts by European settlers who are forced to live in warm countries. This is largely the case with British India: where, but for these health resorts, it would be impossible for British officials to live for any length of time.

## AIR MOVEMENTS

The air near the Equator is more heated than the air nearer the poles, and this makes it expand and so become lighter and rise. The surface of the air, therefore, at the Equator is higher than it is to the north and to the south of that line, and the air from the Equator flows northward and southward in the upper regions.

With a stream of air flowing north and south the amount of air, and therefore the weight or pressure of it, at the Equator is lessened, and to restore the balance colder air flows in from the north and from the south along the bottom of the atmosphere, to take the place of the risen air.

This statement of the case leaves out of account the motion of the earth, which makes the air coming to the Equator from the north and

## AIR MOVEMENTS

south seem to come also from the eastward, and the air moving the Equator towards the poles seem to move also from the westward. The direction in which a moving body will be turned is different in the northern and in the southern hemisphere. Looking in the direction in which the body moves, it will be found that in the northern hemisphere it seems turned to the right, while in the southern hemisphere it seems turned to the left. This simple but important law which is shown at work in air movements and in water movements is usually spoken of as **Ferrell's Law**.

Though the air near the Equator rises up and overflows towards the north and towards the south, the barometer shows that the pressure or weight of a column of air at the Equator is low. Just outside the Tropics, on the other hand, on the polar sides of the thirtieth parallels of north and of south latitude, there are two belts of calms and high pressure.

From these belts the air flows both towards the low-pressure belt of calms and rains near the Equator, and towards the not quite so markedly low-pressure belts of calms round the poles in the neighbourhood of the Arctic and Antarctic circles.

The air moving towards the low-pressure equatorial belt is very steady where the presence of land does not interfere with its progress, so steady indeed is it that the winds both north and south of the Equator are spoken of as **trade winds**, not, as is sometimes said, on account of their advantage to trade, but because they blow in a regular trade or tread, that is, path. They blow from the north-east and from the south-east, and meet in the belt of equatorial calms and rains called the **doldrums**.

### Trade Winds

The trade winds in blowing over the sea become saturated. They are blowing from a colder part to a warmer, and the power of the air of absorbing moisture is increased with the increase of temperature. Moist air is lighter than dry air, because water-vapour is little more than three-fifths of the weight of air under the same conditions of temperature and pressure, so that the tendency of these winds is upwards.

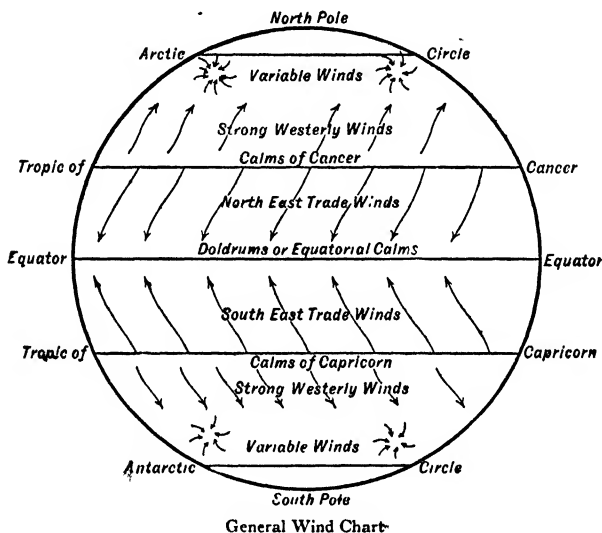
When the northern and southern trade winds meet they balance each other and produce a region of calms and of constant rains which follows the course of the sun. It goes north of the Equator when the sun is north of the Equator, and south of it when the sun is south of the Equator; but it never goes so far south as it does north. In the northern summer it goes as far north over the open ocean as from  $12^{\circ}$  to  $15^{\circ}$ , and in the southern summer as far south as from  $5^{\circ}$  to  $8^{\circ}$ . It will thus be seen that the equatorial belt of calms ranges over about  $20^{\circ}$  of latitude. This belt forms the **Equatorial Forest Belt**, a region of almost constant rains. Places within the limits over which the belt of calms passes twice a year have two rainy seasons, while those near the



## GENERAL GEOGRAPHY

edges of the belt have only two seasons—a short wet and a long dry season. The high-pressure belt of calms and light winds along the northern edge of the trades is often spoken of as the **horse latitudes**.

When the trade winds blow over the land, as they are being constantly more and more heated, they take up moisture, so that the land regions over which they blow are arid; such are



the deserts of the Sahara, the Kalahari, Arabia, the Plateau of Iran, the Indian Desert, Central Australia, &c.

### Westerly Winds

In the belts of westerly winds the winds are blowing from a warmer to a colder part, and may therefore give up some of their moisture even at sea level. When they cross mountains they are rain-bringing winds on the windward slope and dry winds on the leeward slope. The rainfall on the western slopes of the mountains in the Indian Peninsula is very heavy, while in uplands of the Deccan, both in Madras and Bombay, the rainfall is slight.

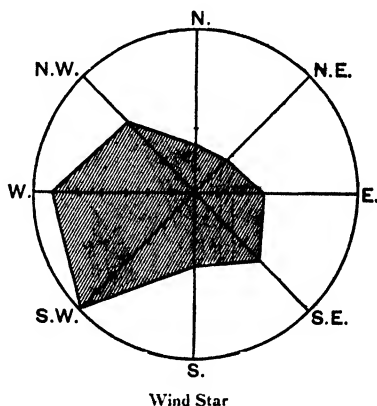
The south-western and north-western winds, which blow respectively in the Northern and Southern Hemispheres on the poleward side of the trades, and which are often spoken of as the **Anti-trades**, are not quite so remarkable for their steadiness as the trades themselves, though in the Southern Hemisphere they are so strong and steady that the region in which they blow is known as the "roaring forties".

### The Monsoons

The diagram on page 50 shows the general scheme of the wind systems of the earth. Roughly we may say that the centre of the wind systems of the world is the equatorial belt of low pressure. But very great changes in the position of the belt are brought about by the heating in the northern summer of the land masses of northern Africa and southern and central Asia, and in the southern summer by the heating of the land masses of Australia and South Africa.

The effect of the heated land masses is to make the air over them much hotter in the summer than the air over the sea, and to make it much colder and therefore much heavier in the winter. The winter cold is due to the more rapid radiation or loss of heat by the land than by the water. In the northern summer the low-pressure belt, the doldrums, is drawn northwards over the land almost beyond the Tropics, and the south-east trade wind is drawn therefore north of the Equator and blows in south-eastern Asia and the south-west of North America as the **South-west Monsoon**. In the southern summer matters are reversed. The north-east trade is drawn across the Equator, and blows in the north of Australia and in South Africa as the **North-west Monsoon**. India, Further India, and China and Japan are the principal monsoon countries in the Old World; and the south-western States of America, Mexico, and Peru in the New.

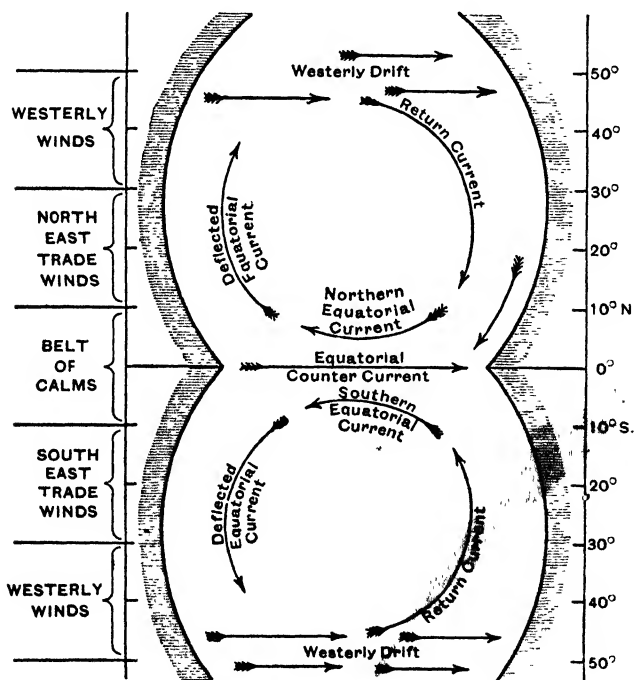
Roughly, the hot region of the world corresponds to the tropical belt, and is the region in which the trade winds prevail; the warm temperate belt is a region of westerly winds, south-westerly north of the Equator and north-westerly south of it. It is mostly, as in the Mediterranean



region, a belt of winter rain and of summer drought, a belt chiefly of evergreen trees. Nearer the poles, that is between the fiftieth and sixtieth parallels of latitude in the Northern Hemisphere, we have a region of "variable" winds. Careful observation of these when tabulated gives a figure, a "wind star", like the one given on p. 51.

### Ocean Current due to Winds

The meeting of the trade winds in the belt of calms called the doldrums is very important in another way. The winds



General Circulation of Waters of the Ocean under Influence of the Winds

from the north-east and south-east between them press the waters of the ocean steadily towards the west. In this way a regular set of the water of the Pacific, the Indian, and the

Atlantic Oceans towards the west is caused, or what is called the **equatorial current** is formed.

This causes an eastward flow of the water to the north and to the south to take the place of the water driven westward. These eastward sets of the water are called the **Northern and Southern Equatorial Counter Currents**.

In the case of the Atlantic the heated surface water driven westward is forced into the Caribbean Sea, and thence into the Gulf of Mexico, and in the case of the Pacific it is forced into the Chinese Sea. The Atlantic water finds its way northward on the western side of the Atlantic as the **Gulf Stream**, which turns eastward off the south coast of the Dominion of Canada and becomes lost in the Atlantic. The warm water of the Pacific finds its way out of the China Sea as the **Japanese** or **Kuro Siwo** current. Off the coast of Japan this current, like the Gulf Stream, becomes merged in the north-western set of the surface water of the Ocean. The equatorial currents in both oceans split when they meet the land, sending the branches already spoken of north, and sending two other branches south. In the Atlantic the southern branch is the **South American**, or **Brazil Current**, which goes south along the coast of Brazil; and in the Pacific it is the **Australian Current**. Besides these in the Pacific a third branch passes between the islands and is continued towards Africa as the **Equatorial Current** of the Indian Ocean.

### Currents due to Differences of Temperature

Owing to the difference of temperature between the circumpolar and the hot belt, the water of the hot belt, being lighter, sets steadily on the surface towards the poles, while the colder circumpolar water pushes its way towards the hot belt along the bottom of the sea. There is thus a steady set along the bottom of the ocean of cold water from the polar regions to take the place of the warmer water of the hot belt which overflows in the direction of the poles.

This set of the surface water is best seen north of the trade-wind regions, where it is aided greatly by the prevailing south-westerly or, in the Southern Hemisphere, north-westerly winds.

Owing to the earth's motion, the water setting polewards, like the wind blowing towards the poles, seems to come from the south-west and from the north-west, while the cold water moving towards the hot belt seems to come from the east, and is washed up against the western shores of the ocean. Thus both in the Atlantic and the Pacific the warm surface water is pushed up along their eastern shores in the Northern Hemisphere and along their western in the Southern.

The shores of Europe in the Atlantic have the warm surface water pushed against them, and so also have those of North America in the Pacific, while the western coast of Africa, south

of the Equator, the eastern shores of North America, the western shores of South America and Australia, and the eastern shores of Asia are washed by the cold currents moving from the poles to the Equator.

The difference in temperature of the waters that wash their shores causes a great difference in the climates of the eastern and western parts of the land masses. The climate of eastern America, that is of Labrador, Newfoundland, Nova Scotia, and the New England States, is much colder than the climate of places in Europe in the same latitude. In a similar way the climate of eastern Asia, of Siberia, Manchuria, Korea, Japan, and northern China is much colder than the climate of Alaska, British Columbia, and the most western of the United States. °.

## RAINFALL

Hot air can hold much more water vapour than cold air; and it is when the air is cooled, either through ascending or through coming in contact with a cold surface or a cold current, that the invisible vapour held in suspension becomes condensed, and takes the form of cloud or actually falls as rain.

The hot winds that meet in the equatorial belt of calms, especially where they have crossed the sea, are moisture-laden, and when they meet become **ascending** currents. Thus they are cooled and the equatorial belt of calms becomes a region of continuous rainfall.

The air, of course, besides being cooled by rising, may be cooled by passing from a warmer region to a colder, and so may have to part with some of its moisture in the shape of rain or snow. Thus winds, such as the south-west anti-trades and the strong westerly winds of the southern seas, blowing from nearer the Equator towards the poles are as a rule rain-bringers. Where the winds strike such steep and lofty mountains as the **Himalayas**, or such mountains as the **Western Ghats** in the Deccan, the rainfall is very heavy.

The rainfall on the windward side of mountains continues to increase as we ascend till, on an average, the height of between 3000 and 6000 feet is reached, and then it grows less. Towards the summits of lofty mountains the rainfall becomes smaller and smaller on account of the small amount of moisture that air at a low temperature can hold.

On the leeward side of mountains the descending air becomes condensed and is heated up; and its capacity for absorbing moisture is increased. Such a wind is the **Föhn**, which blows north from the mountains of Switzerland.

Cold currents from the poles wash the east coasts of North America and of Asia, and the west coasts of South America,

Africa, and Australia; while the west coasts of Europe and North America, and the east coasts of Australia, Africa, and South America are washed by warm currents.

Winds blowing across cold waters are cooled down and reach the coast as dry winds. This accounts for the low rainfall of Western Australia, of south-western Africa, and of the west coast of southern America. Winds that cross warm surface currents like the North Atlantic Drift Current, or the North Pacific Drift Current, or the Agulhas Current off the east coast of Africa, are invariably rain-bringers. They are heated up in crossing the warm water and become moisture-laden. On reaching the land they are cooled down and have to give up part of their moisture.

In the cool **North Temperate Belt** the western coasts both of Eurasia and of North America have a heavy rainfall, and the rainfall diminishes as we go inland, and ends in north-eastern Asia in an almost rainless region.

In the **Warm Temperate Belt** the western margin of Eurasia is a region of summer drought and of winter rains, gradually diminishing as we go eastward till the almost rainless region of Central Asia is reached; and the **western side** of North America, like the Mediterranean, is a region of winter rains, where the rainless region of Central Asia is represented by the high plains east of the Rockies. The east side, too, of North America is a region of heavy rainfall, especially the south-east.

Across Africa and southern Asia, in the neighbourhood of the Tropic of Cancer, there is a vast, almost rainless stretch where the trade winds blow over the land. There is no corresponding part in the west, owing to the distribution of the land and the water, but in the Southern Hemisphere we have the corresponding deserts of Australia, of Africa, and of South America.

The south-east of the Old World is a monsoon region with summer rains and winter drought.

The rainfall on both sides of the Equator is heavy, and the region may be divided into a Northern and Southern Belt with short wet summers and dry winters, and a Central Belt with two wet and two dry seasons.

## CLIMATIC REGIONS

### Insular or Maritime Climates

In the neighbourhood of the ocean the air is usually moist and the rainfall heavy. Even on the east-coast belts of northern America and northern Asia the rainfall is heavier than it is farther inland. As the air in the form of wind passes over the continent it loses much of its vapour and the rainfall grows less. The air becomes drier.

It must be kept in mind that the water vapour in condensing gives up heat, and that this heat warms the surrounding air; so that the heavier rainfall, as well as the neighbourhood of the water, tends to make maritime climates more equable than continental climates.

### Continental Climates

The land surface absorbs the heat of the sun in the summer and gives it out readily to the air; so it raises the temperature of the air over it much more than the temperature of the air over water is raised. In winter the opposite is the rule: the land surface gives off so much more heat than it receives that it grows steadily colder and colder, and cools down the air over it.

There is therefore in such inland places a great difference between the temperature of the summer and the temperature of the winter. The difference, then, between the climates of the east side and the west side of the oceans in the same latitude, and between the climates of the ocean borders and the inland parts, must be taken into account.

### Mountain and Plateau Climates

The height or distance above sea-level of a region has a very considerable effect on the temperature of the region, and on other matters included under the general term Climate. As the average annual temperature is lowered by a degree for every 300 feet the region is above sea-level, the importance of height as far as temperature is concerned is manifest. The climate of higher regions is marked also by a decrease in pressure and a decrease in the amount of moisture in the air. This decrease in pressure and in the amount of water-vapour in the atmosphere is accompanied by a great increase in the strength of the sun's heating power. So great is this that in some cases the difference between the temperature in the shade and in the sun is remarkable. In the Himalayas, at Leh, Hooker found this difference to run from 70° to 90° F. Mountain parts in the neighbourhood of the sea, too, are usually wetter and have less sunshine than lowland parts. The highest rainfall on mountains like the Himalayas, is at about 6000 feet above sea-level; above that the rainfall rapidly decreases. Mountains and plateaus have also a higher wind velocity than lowlands.

### Climatic Regions

When speaking of zones it was pointed out that there were five of these to be considered from the point of view of climate. One tropic, two temperate, and two frigid. It was also pointed out that the temperate must be regarded as divided into a **warm temperate**, or sub-tropical, and a **cool temperate**. The tropical belt also must be divided into a **northern tropical** and a **southern tropical** belt, with an equatorial belt separating them.

Bearing in mind that the land in each of these climatic belts has an eastern and western as well as an inland or continental part, it will be seen that there must be a large number of different climatic regions to be considered.

In the Northern Hemisphere we have, in the **temperate belt**, on the eastern side of the ocean a **western warm maritime climatic region**, and north of it a **western cool maritime climatic region**. On the western side of the oceans we have an **eastern warm maritime climatic region**, and north of it an **eastern cool maritime climatic region**. The climate of the eastern region, it must be remembered, is in every case more extreme and on the whole is less warm than that of the corresponding western region. In addition there are the **warm temperate continental** region and the **cool temperate continental regions**. The climate of these regions is more extreme, and on the whole is less warm, than the climate of the corresponding eastern or western maritime regions. In the temperate regions in the Southern Hemisphere matters are partially reversed. It is now the western side of the ocean or the eastern side of the land masses that has the milder and warmer climate, and the eastern side of the oceans or western side of the land masses that has the colder and more extreme. Here, however, as in the Northern Hemisphere, the climate of the interior of the land masses, the continental climate, is more extreme than that of either the eastern or western edges.

As we go nearer the Equator the differences in temperature between one season and another decrease, though the climate of parts near the sea continues to be less extreme than the climate of parts farther inland.

Too little is known of the variation of the temperature in different parts of the Arctic and Antarctic regions to enable a subdivision to be made. The **equatorial belt** may be said to consist mainly of a **central region** with two rainy seasons every year. This is a region of almost constant rains. It has a region to the north and another to the south of it in which there is only one short rainy season, the summer, followed by a long dry season.

These climatic regions have been discussed without reference to the height of the land, &c., which, as you have learned, has a most important influence on the temperature and on the rainfall, that is, on the climate, of places.



## PLANT LIFE

Life on the earth is largely dependent on the temperature and rainfall of the parts where it occurs. In the map of the zones it was found that the tropical or warm zone, which we took to be the zone bounded both on the north and on the south by the annual average isotherm of  $68^{\circ}$  F., was broader than the Tropics proper. It stretched north and south for a little more than 30 degrees on each side of the Equator. The limit of the temperate belts was taken as the isotherm of  $50^{\circ}$  F. for the warmest month, that is, for the month of July in the Northern Hemisphere, and for the month of January in the Southern Hemisphere. This isotherm was chosen as the boundary of the temperate belts because it marks the northern and the southern limit beyond which trees do not grow even in sheltered positions.

**Temperature**, it will thus be seen, plays a very important part in plant life; but temperature does not by any means play the most important part. For the growth of plants an adequate supply of **water** is an absolute necessity. They need it for the building up of their tissues, and the loss of water from their exposed surfaces is a necessity of their circulation. Under unfavourable conditions plants modify their parts so as to be able to get on with a smaller supply of water than usual, but water they must have if they are to live. In addition to water and heat, plants, at least all green plants, must have **light** to enable them to grow properly. Some, of course, need more light than others. Plants also must have **air**, because from the air they draw a large part of their nourishment, the material they use for making cellulose, starches, and sugars. From the **soil**, which is another necessity for plant life, they draw the supply of nitrogen as well as the moisture, and the potash, soda, lime, and other salts dissolved in it, which they need for food.

## Distribution of Plant Life

**Moisture, temperature, and soil**, therefore, must be considered in discussing the distribution of plant life on land. With regard to the last of these, the chief point to be remembered is that the most fertile soils are those that are formed of a mixture of the waste of different kinds of rocks.

Among sedentary soils, therefore, the most fertile are those that occur at the outcrop of different strata; but sedentary soils are as a rule much less fertile than transported soils, such as those of river

valleys, or the wind-transported loess of the plains of central Europe and north-eastern China.

With regard to temperature, we have already seen that the surface of the earth may be divided into a hot belt on both sides of the Equator, in some cases stretching to beyond  $30^{\circ}$  of north latitude, and in others to beyond  $30^{\circ}$  of south latitude, a temperate belt to the north of the hot belt and a much narrower temperate belt to the south, and an ice cap round each of the poles. The temperate belts are subdivided into warm temperate or sub-tropical and cold temperate.

If you compare a rainfall map of the world with a map of the productions you will see clearly that, as might be expected, the **forest regions**, that is the regions where vegetable life shows itself strongest and most prolific, are regions of heavy rainfall; that the mixed forest and grass-land regions, the **savannas**, are regions of slighter rainfall; that the steppe or grass-land regions are regions of comparatively scanty rainfall, which gradually pass, as the rainfall decreases, into the desert regions, or regions almost without life.

### Equatorial and Monsoon Forests

The belt of equatorial calms and constant rains called the doldrums moves northward and southward, as has been said, with the sun. As might be expected, it goes farther north than it does south. In the southern summer, over the ocean, it only goes a little more than  $5^{\circ}$  south of the Equator, but in the northern summer it reaches as far north as  $12^{\circ}$  over the ocean.

The unequal distribution of the great masses of land in the Northern and Southern Hemispheres affects this low-pressure belt still more, and by drawing it farther north of the Equator gives rise to the **monsoons**, the belt of calms being followed across the Equator by the trade winds, which become in the northern Hemisphere the **south-west monsoon**, and in the Southern Hemisphere the **north-west monsoon**.

The belt of equatorial calms itself has a breadth of from 150 to nearly 500 miles, and the part over which it passes is a region of almost constant rainfall. This is the equatorial belt proper, the moistest and hottest part of the earth, the **region of vast forests** and of a vegetation so luxuriant that man has hitherto been able to make only comparatively slight use of the region as a habitation.

Such are the forests of the Amazon and Congo in **South America** and Africa respectively, and of Borneo and New Guinea in the **East Indies**, and of the Indian Western Ghats and Burma in the **monsoon region**. The races of men that have been forced into this forest region are even at the present day in a state of savagery.

The monsoons south-west and north-west, as they are saturated winds passing from a warmer to colder regions, are rain-bearers, and the coastal parts of monsoon countries are, like the equatorial belt, forest regions.

The equatorial and monsoon forests yield valuable timbers, such as **teak**, **rosewood**, **mahogany**, **satinwood**. The Tropical and monsoon forests yield, besides timber and dye-woods, valuable vegetable fibres like **manila**, **sisal hemp**, and **jute**, **drugs** of different kinds, **spices**, **pepper**, **cinnamon**, and **cloves**. From them, too, we get our supplies of **rubber**. Of rubber, as of gold and diamonds, the British Empire is the chief producer.

In the hot belt rice and millet are the principal cereals, and **plantain** and **bananas**, **yams**, **sweet-potatoes**, and **lentils** form part of the food supply. **Tea**, **coffee**, and **cocoa** are either products of the hot belt or of the warm or sub-tropical belt; so also is the **sugar cane**. **Cotton** is a tropical plant and **tobacco** is largely grown in the same area. Among the fruits are **pineapples**, **oranges**, and **lemons**. The **palm** is the characteristic tree, and there are innumerable varieties of it. The cocoanut palm is almost confined to the coastal parts and to the islands within the Tropics, the date palm to the Sahara and the Arabian and Persian deserts, and the oil palm to the coast of the Gulf of Guinea.

### Savannas, Steppes, and Deserts

Where in the warm belt the rainfall is smaller than in the central tropical or forest belt proper, thorn forests occur; and where the rains are still scantier, the forests are replaced by tropical **savannas**.

These are not entirely treeless, but the trees occur only singly or in clumps. In the savannas the grass grows in some cases to a height of 20 feet. It ripens in the rainy and dies down in the dry season. The growth of **maize**, **rice**, **wheat**, &c., and the rearing of cattle, sheep, and horses are the chief occupations of people in the savannas.

As the rainfall decreases the savannas or tropical grass jungles give place to **steppes**, and these in turn to **deserts**.

In the Northern Hemisphere, in the trade-wind region, a vast line of deserts runs in the Tropics from the Atlantic to the basin of the Ganges, and in the New World a similar desert occupies a considerable district in the south-western States of America and in northern Mexico. A similar succession of deserts is found in the Southern Hemisphere; but, as might be concluded, the deserts there lie towards the west of the land masses instead of towards the east.

These deserts are due to the fact that the prevailing winds are blowing from a colder to a warmer region, and so are moisture-seeking,

not moisture-yielding winds. In some of the continental desert regions, such as the Desert of Gobi, the winds, even when blowing from a warmer to a colder region, have been previously deprived of their moisture in passing over mountains, and cannot be rain-bearers. In these desert regions the annual rainfall is everywhere less than 10 inches a year, in most parts indeed it is less than 5 inches.

On the polar side of the desert comes a region of scanty rainfall, in which grass takes the place of trees. This is the **steppe** land, which with the deserts occupies so much of the sub-tropical portions of the land surface.

The temperate belts are by some geographers divided into two and by others into three belts. Those who divide them into three speak of a warm temperate belt, a cool temperate belt, and a cold temperate belt. The simpler division into a warm temperate and a cool temperate will be quite sufficient for most purposes.

The **warm temperate** belt is the part lying between the annual isotherms of 68° F. and 55° F. as shown on the map.

On the eastern side of the northern land masses the portion of the warm temperate belt is one in which the rain falls in the **summer**. There **rice**, **cotton**, **maize**, and **tobacco** are among the characteristic products.

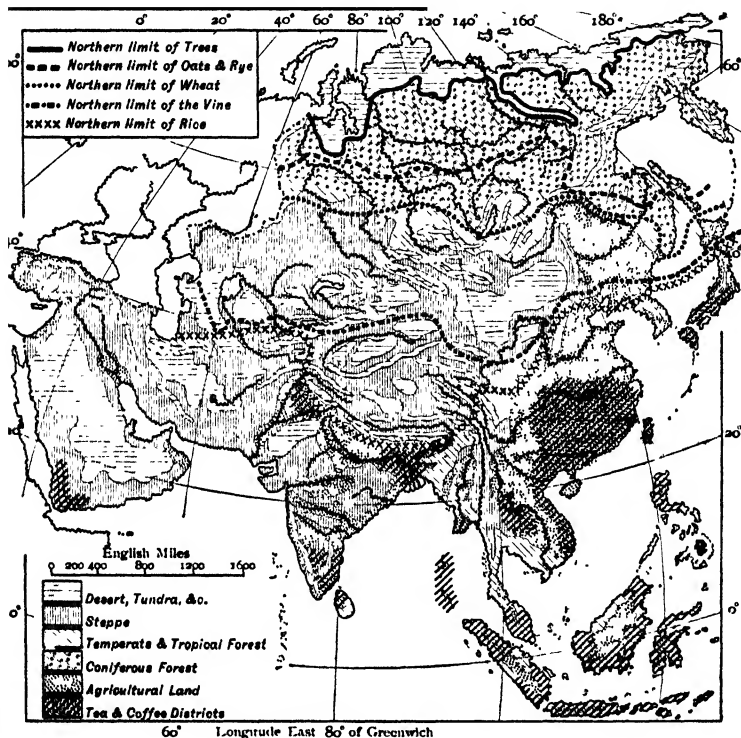
The western edge of the warm or sub-tropical part of the temperate belt of Eurasia, and North America, and of the three southern continents consists of a region of **winter rains** and **summer droughts**. The trees and shrubs are mostly evergreen, and where the rainfall is abundant there are forests. The **olive**, the **myrtle**, the **mulberry**, and the **cypress** are among the trees, and **grapes**, **oranges**, **lemons**, and other fruits are cultivated. Cotton and tobacco are grown. This is often spoken of as the **Mediterranean type** of plant life.

The western and eastern margins of the land masses of the **cool temperate** belt consist of mixed grass lands and forests, chiefly of **deciduous trees**, giving place, as we go farther towards the interior, to grass lands and, as the rainfall decreases, to **steppe land**, and then to desert. Nearer the pole is the **pine forest region**, which stretches as far north as the isotherm of 50° F. for the warmest month.

The cool temperate belt is at present the great industrial and commercial part both of the Old World and the New. The southern part of it, besides **agricultural land**, consists of forests of **oak**, **ash**, **beech**, **maple**, and other trees that lose their leaves in autumn. The chief grains of the region are **wheat**, **oats**, **barley**, and **rye**. **Flax** and **hemp** are grown for their fibre, and beet is cultivated on account of the

sugar it yields. The **vine** is cultivated as far north as the fiftieth degree of north latitude, and **potatoes** are largely grown for food in some parts up almost to the edge of the Arctic Circle.

The northern part of the cold temperate belt in both the Old and



Map of Asia, showing Surface Features

New World is occupied by pine forests, and the mixed grass and agricultural land forms only a small proportion of the whole.

**Wheat** is not grown in the north-west of Ireland or the north-west of Scotland, nor farther north than the south of Norway and Sweden. **Oats** and **barley** and **rye** are grown as far north as the Arctic Circle in the west of Europe, but in eastern Asia and eastern North America they scarcely reach beyond the fiftieth degree of north latitude.

As a rule the pine forests occur where the rains are scanty and

the winters severe; but in the west of America pines have pushed themselves well to the south, and there they grow to great size. They attain great height also on the western hills of Norway.

In the temperate belt the grass lands, known by the names of **steppes** and **prairies** and **pampas**, occupy a considerable part of the interior of the continents. They occur wherever the rainfall is scanty and the summer hot. Near rivers and where they can be irrigated such temperate grass lands become valuable agricultural districts.

North of the isotherm of 50° F. for the warmest month the trees gradually become more and more stunted and dwarfed; and, still nearer the pole, **lichens** and **mosses** become the most common covering of the frozen marshes; but nowhere is the winter cold strong enough to completely destroy plant life. Even in the north of Greenland the plains are covered with a vegetation sufficient to support animal life.

## PLANT REGIONS FROM EQUATOR TO POLE

From what has been said it will be clear that if we were asked to classify the chief plant regions between the Equator and the Pole we would draw up a list like the following:—

1. **Equatorial forest region** of valuable timber and other trees.
  2. A **savanna region**, suited for cattle rearing and grain growing.
  3. A **steppe and scrub region** of scanty grass and thorny shrubs.
  4. A **desert region** with scattered oases.
  5. A **steppe region** of scanty grass and thorny shrubs.
  6. A **region of evergreen trees** and of grains and fruits.
  7. A **mixed grass and forest region**, giving place, towards the more inland parts, to steppes and deserts.
  8. A **pine forest region** with grass lands.
  9. A **region of lichens, mosses, alpine plants, and dwarf shrubs.**
- A similar succession of surface features presents itself as we pass from the Equator towards the south pole; but the southern limit of trees, as the map of climatic zones shows, is much nearer the Equator.

## ANIMAL LIFE ON LAND

Animals depend directly or indirectly on plants for their food supply; and, like the plants, may therefore to a greater or less extent be arranged in belts. Those animals that have been domesticated—the **dog, horse, sheep, and cow, &c.**—are taken by men to almost every part where they themselves settle. The

horse, the cow, and the sheep are found from the Arctic Circle almost to the Antarctic, save in equatorial and sub-equatorial districts. It was by the help of sledge dogs that men were able to reach the poles.

Animal life, like plant life, is most luxuriant in the equatorial regions. There **insect life**, **bird life**, and **reptilian life** are on a gigantic scale; while **graminivorous** and **carnivorous mammals** attain their greatest size. Innumerable species of **monkeys**, too, inhabit the woods, and the savannas and steppes are roamed over by crowds of buffaloes and antelopes, which are preyed upon by lions, tigers, and other carnivorous beasts.

**Ivory** from the elephant and the hippopotamus, **ostrich** <sup>o</sup> **feathers** in the equatorial parts, and **hides**, **wool**, and **tallow** from the savannas are the chief animal commercial products if we do not include silk.

The **camel** and the **dromedary** are the most distinctive animals of the desert and the steppe regions of the Old World. The **horse**, a native of the grassy steppes of Central Asia, has now its home in all parts where men live. It is the domestic animal most valued by the nomad and semi-civilized tribes that inhabit the steppe lands on the border of the desert.

**Silk** is the animal product most characteristic of the warm temperate belt, though it is produced also in the equatorial parts of India.

While the wealth of the nomads of the steppe lands of the temperate belt consists almost entirely of their flocks, from which they get both their food and their clothing, almost everywhere in the temperate belts **cattle**, **sheep**, and **pigs** are reared as well as **horses**, and various kinds of birds have also been domesticated.

Besides **beef**, **pork**, and **mutton**, &c., the domesticated animals of the temperate regions yield **butter** and **cheese**, **tallow** and **hides**, as well as **eggs** and **feathers**.

The commercial animal products of the pine forests of the north consist chiefly of furs and skins. The products of the warm south temperate belt are similar to those of the north temperate belt. These regions have been peopled chiefly from the north temperate belt, and the settlers have brought to these southern lands the cattle and sheep and other animals of the northern lands.

### Temperature and Height above Sea Level

Even in the tropical belt, as we ascend from sea level the temperature grows less and less, until the vegetation, which passes gradually from tropical through warm temperate and cold temperate, gives

place to the lichens and mosses of the Arctic regions. As the average decrease in temperature is, in the Tropics,  $1^{\circ}$  F. for every 250 to 300 feet of ascent roughly, it is clear that even under the Equator the snow line will be reached in a rise of a little over 15,000 feet. It is this decrease in temperature that makes the hill stations even under the Tropics endurable, and makes it possible to grow the cereals and fruits of Europe on the tablelands of Africa, even under the Equator.

## MINERALS

From the solid part of the earth, the rocks, men have obtained the minerals which have made civilization possible. Those most valuable to man are usually found where the older rocks come to the surface; in other words, in those parts where the newer rocks have been worn away.

**Gold** and **silver** are known as the precious metals, and are found pretty widely dispersed through the old rocks of Europe, Asia, Africa, America, and Australia. **Silver** is found very often associated with lead. **Gold**, which is largely used for money, is at present chiefly produced from the mines of British South Africa and Australia, from the United States, from Russia in Asia, and from Canada and India. Silver is got chiefly from mines among the Cordilleras of the Rockies, and of the Andes, and from Australia.

**Copper** is now got most largely in the neighbourhood of the great lakes of North America, and from the mines of Spain. **Tin**, formerly got chiefly from Cornwall and Devon, is now got mainly from the Malay Peninsula and from islands in its neighbourhood. **Iron**, the metal most useful to man, is also the most widely distributed. Formerly Great Britain was the chief iron-producing country; but now the United States produces more iron and steel than Great Britain does.

In modern life **coal** is the most important of all the minerals. It seems, like iron, to be very widely spread. In actual coal production till lately Great Britain took the foremost place. Now the country which produces most coal is the United States.

The amount of production must not be taken as any indication of the resources of a country. In all probability Canada, the United States, Australia, China, Russia, and other countries have much larger coal supplies than Great Britain.

**Gas** and **mineral oils** are also used now as fuels. The United States, Russia, Persia, and Burma are at present the chief sources of the supply of oil; though Rumania, Galicia, the East India Islands, and Japan also yield oil. Of precious stones, as of gold, the British Empire is the principal producer. Diamonds are now chiefly got from the mines of South Africa, though India and Brazil were formerly famed for their production.



## MANUFACTURES

The growth of manufactures during the nineteenth century was enormous. In the application of machinery to industry the people of Britain and of British extraction took the lead. Water, steam, and, more recently, oil, gas, and electricity, supplied the power by which the machinery was driven, and so numerous were the inventions of means of saving labour that it soon became scarcely possible to find any industry that was entirely carried on by hand.

The most civilized countries of Europe, Great Britain and France,<sup>o</sup> took the lead in the race, but they were followed later by Belgium, Holland, Switzerland, and later still by Germany, while the United States, after Britain, acquired a foremost place in inventions and in industry.

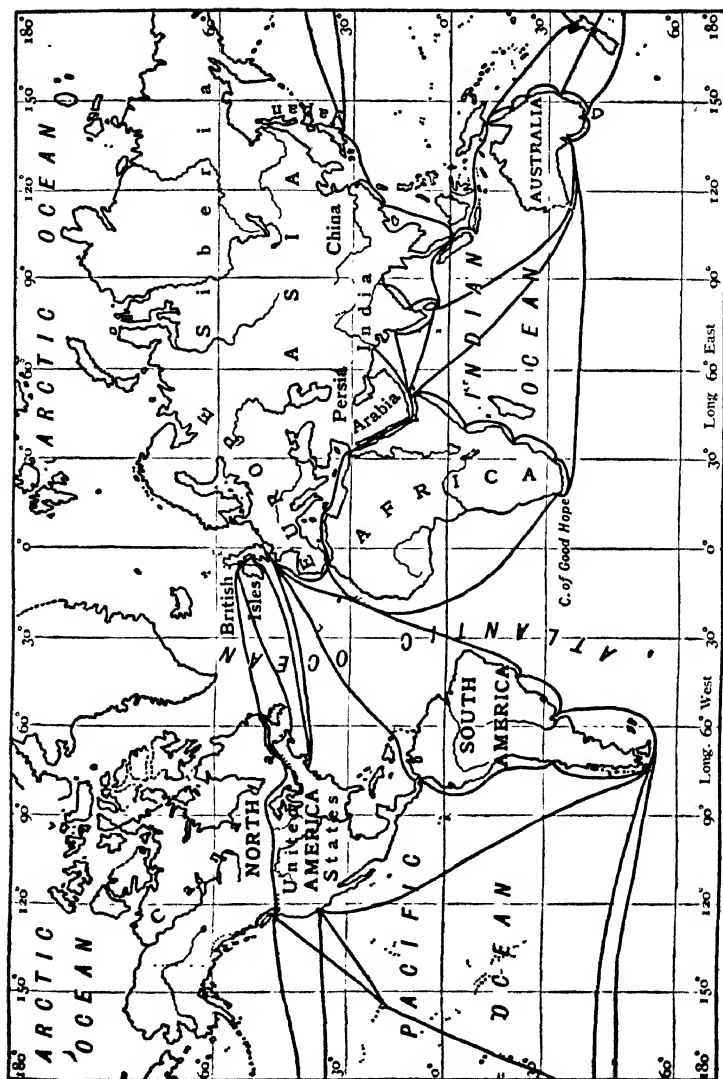
It is interesting to remember, from the geographical point of view, the use made in the United States, Canada, and Switzerland of water power. This force, formerly almost utterly unused, is now being turned to the service of man. It is the use made of her waterfalls by Switzerland that enables that country to take a good place among the manufacturing nations of the world.

India, China, and Japan are now wakening up to the need for using modern productive methods, the latter, in particular, having become within the last few years a great manufacturing country. With the exception of India, the chief manufacturing regions both of the Old World and of the New are outside the Tropics. They lie in both land masses between the fortieth and the sixtieth parallels of north latitude. In the Southern Hemisphere also the manufactures, which are used at present mainly to supply local needs, are also carried on chiefly outside the Tropics.

## COMMERCE

The need of a market for their manufactures and of a supply of the raw materials, the cotton, the wool, the flax or hemp, or jute, required for them, as well as the need for foodstuffs to supply the wants of the operatives employed in the various manufactures, has led during the last hundred years to an enormous increase in local and in international trade.

To meet the vastly increased demand for carriage of goods, the old sailing ship, which depended on the winds, gave place to the steamship, which was invented in Great Britain at the beginning of the nineteenth century, and steamships increased steadily in size till they grew into the huge cargo boats that pass with almost perfect regularity from one



land to another. Water carriage, where it can be got, is cheaper than any form of land carriage, and during the nineteenth century there was a considerable increase in canal traffic. To shorten the voyages to the east, the Suez Canal was made in the middle of the nineteenth century, and to facilitate the interchange of goods between countries in the basin of the Pacific Ocean and countries in the basin of the Atlantic Ocean the Panama Canal has been made across the isthmus that separates Central America from South America.

### Railways

As the trade between the manufacturing districts and the rural districts grew, improved means of transport were devised. In advanced countries, particularly in Great Britain, good roads were made, and wheeled traffic took the place of pack animals. Then Stephenson, an Englishman, invented the locomotive, and soon railways began to be constructed in both hemispheres.

Railways, like roads, are means of communication between places, and like the roads, too, have their courses determined by the physical conditions, that is, by the geographical features of the country through which they pass. In Europe and Asia, as well as in Canada and the United States, the main trade routes, the roads followed alike by commerce and by conquest, run **east and west**. In Europe and in Asia, as well as in Central America, South America, and the United States, the main rivers run more or less from north to south, providing a cheap means of transport in that direction. The need of commerce, therefore, was for roads joining the east to the west. This is the chief reason for the east-to-west direction of the chief roads and lines not merely in Canada and the United States but in Europe and in Asia also. At present there is only one continuous line of railway across Eurasia from the Atlantic to the Pacific—the line by **Berlin and Moscow**, through Russia and through Siberia, along the southern edge of the Forest region and through Manchuria, to **Port Arthur**, with a branch through Korea to **Fusan**. Throughout the greater part of its length this line crosses the great plain, and the streams to the north and to the south of it flow almost at right angles to its direction. In the eastern and shorter part of its length it turns to the south-east, but still runs at right angles to the general course of the rivers.

The other land communications between the east and west of Eurasia are by no means complete. It seems probable that, in course of time, the Indian railway system will be joined by a line through Persia, Mesopotamia, and Syria, which will connect with the line to the shores of the North Sea through **Turkey, Bulgaria, Austria-Hungary, Germany, and Belgium**.

It is proposed also to join the Indian railway system to the European Russian system by a line from **Nushki** through **Ispahan** and **Teheran** to **Baku**; and it is also proposed, by a line from **Quetta** to **Merv**, to connect India with the Russian line through Central Asia.

Finally, it is probable that this Russian Central-Asian system may be joined up with the railway system of China.

In the three southern land masses, South America, Africa, and Australia, railway construction has not been undertaken to anything like the same extent, but it is now being proceeded with rapidly both in the east and in the west. The great project of a railway from the north of Africa to the south has been considerably advanced during the last few years, and it is now possible to go from Cape Town to Lake Tanganyika by rail. A railway also has been made from the Nile to Port Sudan, and another from Victoria Nyanza to Mombasa. In Nigeria, too, and the Gold Coast, there has been a considerable extension of railways in the last few years.

## RACES OF MANKIND

The human race, it is supposed, originated somewhere in the Malay Peninsula, or in the East Indian islands. It is not necessary to discuss the reasons for this supposition, the point to be remembered is that the human family is generally held to be one, and to have had a common origin. Environment has, however, created physical differences in the race striking enough to be distinctive—differences in colour, in the shape of head, and in other respects. Taking those differences that seem to be most firmly established as the basis of the classification, it is usual to divide mankind into three, or rather into four, great groups. This classification, it must be remembered, is almost entirely according to the colour of the skin.

The **White race**, though it does not outnumber all the others, is at present the most numerous of the great race divisions. It occupies Europe, most of south-western Asia, of northern Africa, North and South America, and Australia. It is divided into a number of sub-groups, and these are further divided according to the languages spoken by the different branches.

The great sub-divisions of the White race are the **Hamitic**, eastern and western, occupying chiefly the north of Africa; the **Semitic**, occupying mainly south-western Asia; and the **Caucasic**, or Indo-European, consisting of southern European, northern European, and Asiatic Aryans. The latter include most of the peoples of the Caucasus, Asia Minor, Persia, Afghanistan, Baluchistan, and Northern India.

The next great division of the human family is the **Yellow race**, which occupies south-eastern, eastern, central, and northern Asia.

The **Amerinds**, or the **Redskins**, are sometimes reckoned as a branch of the Yellow race; but the differences between the two are so striking that it is better to regard the Amerinds as forming a distinct division, the division that at one time occupied the continents of North and

South America. Now they are the least numerous of the great human families.

The **Black race** is now confined mainly to the continent of Africa, and to the eastern archipelago and parts of Oceania. In the numerous islands of the Pacific, representatives of all the three families, the White, the Yellow, and the Black, are, according to some anthropologists, to be met with, the **Maoris** of New Zealand being regarded as belonging to the White race, the natives of New Guinea and of the Solomon



*White*—2, Englishman. 3, Afghan. *Yellow*—1, Chinese. *Black*—4, Negro. *Redskinned*—5, American Indian.

Islands to the Black, and the natives of the Philippines, &c., to the **Malay**, a mixed race with features of both the Yellow and the Black races.

At present the Whites take the lead in industry and commerce. The most commercial nations are those of western Europe and of North America, together with Australia and New Zealand. The two latter, indeed, in proportion to their numbers, do a larger trade than any other people in the world. The most commercial nations are also the chief manufacturing nations, and, as a rule, the countries they occupy are the most thickly peopled. The latter statement does not apply to newly-settled countries like Canada, Australia, or New Zealand.

## PART II

# INDIA AND CEYLON

---

### Position

The **Indian Empire** lies to the south of Asia. A line drawn through Cape Chelyuskin, the extreme northern point of the Asiatic mainland, and through Cape Comorin, the southern point of India, would pass a little to the east of **Delhi**, the capital of the Indian Empire, and would divide India into two nearly equal parts. It would also divide **Eurasia**—the name now commonly given to the land mass consisting of Europe and Asia—into two nearly equal parts.

While India looked at on a map seems much nearer the east coast of Eurasia than the west coast, a careful study of the lines of longitude shows that this is not the case; but that the line of longitude midway between Iceland and Bering Strait would pass through India not very far from Calcutta. It will thus be seen that India is, if anything, nearer the west coast of Eurasia than the east coast; that it occupies, in other words, the middle part of the south of the greatest land mass in the world.

Eurasia, which consists of Europe and Asia, makes up with Africa what is frequently spoken of as the **Old World**, so called because the Americas, North and South, were utterly unknown in ancient times, and when discovered towards the close of the fifteenth century were spoken of as the **New World**, to mark the difference between them and the lands previously known.

Another way of fixing mentally the position of the Indian Empire is to remember that as the earth turns on its axis from west to east in twenty-four hours, and during that period brings in succession every part of its surface under the sun, places to the east have their noon earlier than places farther west. Now **Delhi**, the capital of the Indian Empire, has its noons fully five hours earlier than **London**, the capital of the **British Empire**. That is to say, when it is midday in London it is about ten minutes past five o'clock at Delhi.

It must be kept carefully in mind that the difference of time between two places is the means by which we determine their position east or west relatively of each other. For every fifteen degrees of longitude a place is east of another, it has its noon one hour earlier. This, of course, is due to the fact that the earth revolves or turns completely round, that is, through  $360^\circ$  of longitude in twenty-four hours; and as its motion is steady it must therefore turn through the twenty-fourth part of  $360^\circ$ , that is, through  $15^\circ$ , in one hour.

**Eurasia**, in the centre of the south of which the Indian Empire lies, is the largest of the great masses of land, being fully a third larger than the two Americas, or, as they are sometimes called, the **New World**. It consists, as the name shows, of the two continents, **Europe** and **Asia**, and is the home of probably fully three-fourths of the human race at present. There is strong reason to believe also that the south-eastern part of the mainland of Eurasia is the original home of mankind, though some place this in the islands of the East Indian Archipelago.

**Eurasia** extends more than half-way round the globe. From **Cape St. Roque** west of Portugal to East Cape at Bering Strait is about  $197^\circ$  in round numbers, or fully  $17^\circ$  more than half-way round the world. Eurasia lies entirely in the Northern Hemisphere, and stretches, roughly, through about  $76^\circ$  of latitude, from a little beyond  $1^\circ$  north latitude to a little beyond  $77^\circ$  north latitude; that is, it extends through five-sixths of the distance between the Equator and the north pole.

The southern point of India, **Cape Comorin**, is within  $8^\circ$  of the Equator, or, if we reckon Ceylon, which is structurally a part of the peninsula, in the Indian Empire, within rather less than  $6^\circ$  of the Equator, while the most northerly point of India is nearly as far north as the most northern part of Africa, nearly  $37^\circ$  north of the Equator. India, therefore, runs well into the temperate zone. The meeting point of the Hindu Kush and Karakorum, which is the most northerly point of the Indian Empire, is in lat.  $36^\circ 30'$  north.

India is almost divided into two by the Tropic of Cancer, which runs south of the junction of the Ganges and Brahmaputra, and south also of the mouth of the Indus. The peninsular part of India is therefore almost entirely in the tropics, while the continental part lies almost entirely in the warmest part of the temperate zone.

### Size and Boundaries, &c.

Politically the Indian Empire stretches from the Persian Gulf, or more correctly from Aden on the Red Sea to the French Indo-Chinese possessions on the Upper Mekong. (What is commonly understood as





the **Indian Empire** extends from Persia to French Indo-China.) It has to the north of it the **Russian Empire** and the **Chinese Empire**, to the west **Persia** and the **Arabian Sea**, to the east the **Chinese Empire**, **French Indo-China**, and **Siam**, and to the south the **Indian Ocean**.

It is a vast territory, fully more than half the size of all Europe. Its greatest length from north to south may be taken as about 2000 miles, and its greatest breadth from east to west at about 2500 miles. The total area of this vast empire is little less than 2,000,000 square miles, and its total population between three and four hundred million.

## NATURAL REGIONS

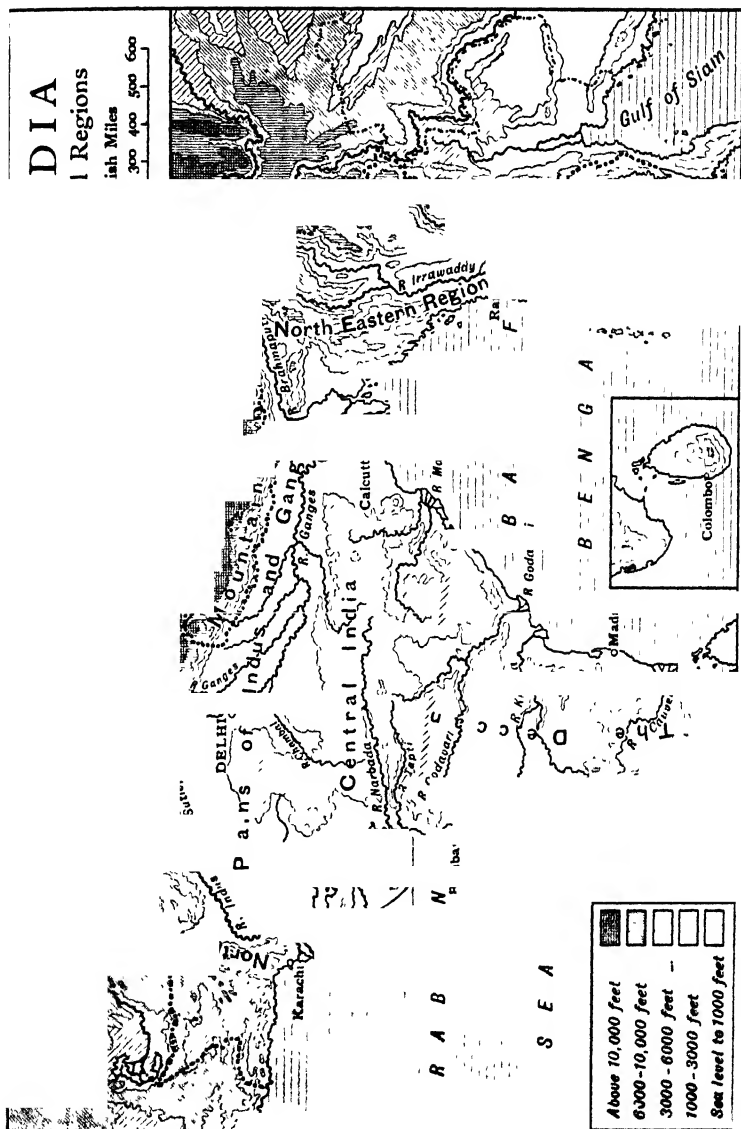
The Indian Empire consists of the great central peninsula of Southern Asia, which may be regarded as made up of a **southern part**, the **Deccan** proper, and a **northern part**, **Central India**; of the vast **continental plain** that lies between the peninsula and the Himalayas, the **plains of the Ganges** and of the **Indus**; of the **Himalayas** themselves, and of the tablelands and mountains of **Baluchistan** and **Afghanistan** on the north-west, and of **Burma** on the north-east.

These five—or if we separate Central India from the Deccan, six—natural regions may each, of course, be further subdivided. The **Deccan** itself, for example, consists of a tableland which, following the contour lines below 1500 feet, would be divided into three distinct parts, an eastern, central, and southern; besides two coastal regions, a broad eastern coastal region and a narrower western.

Similarly the region of **Plains** consists of the **Plains of the Ganges** and of the **Indus**, separated by the higher ground which forms the **Thar** or **Indian Desert**, and its continuation to the Himalayas, and having along the northern edges at the foot of the Himalayas a region of swamp and jungle, known as the **Terai**.

In the Himalayas we may distinguish at least the central or **main axis** of the mountain system containing most of the higher peaks, with, to the north of it, the **main watershed**, a line of high ground which shuts in the valley of the Indus and forms the boundary line between India and Tibet, and to the south the **Outer Himalayas**, and farther south, the **Siwaliks** or foothills, separated from the Outer Himalayas by a number of east- and west-running valleys known as **duns**.

In the north-west mountain boundary region **Afghanistan** and **Baluchistan**, and in the north-east boundary region **Burma**, the natural regions are still more complicated, and may be divided into an even larger number of sub-regions.



## MOUNTAINS

## Himalayas or Northern Dividing Mountains

The most striking surface feature of India is the stupendous chain of folded mountains called the **Himalayas**, which bound it on the north, cutting it off almost completely from Central Asia. These are the eastern and loftiest section of the great system of fold mountains which run across Eurasia, just north of the Mid-world Depression. The Himalayas may also be described as the southernmost of the ranges radiating from the Pamirs. They extend from near the Indus to the bend of the Brahmaputra.

They do not consist of a single mountain chain but form a succession of rugged snowy peaks along the edge of the scarp, where the vast tableland of Tibet, the **Chang**, abuts on the plains of Hindustan. The highest ridge of the Himalayas does not form the main watershed, but is cut across by precipitous chasms through which pour the floods formed by the snows melting on their northern slopes and on the high ground to the north of the crests of the main range. The great central range of snowy peaks runs at a distance of a hundred or more miles from the plain of northern India, from which it is separated by numerous ridges, mostly parallel, which rise in succession one above the other. These ridges, especially on their southern slopes, are often bare, but the northern slopes are, as a rule, tree-covered.

The mean height of the main Himalayas has been estimated at from 16,000 to 20,000 feet. It is known that there are more than forty peaks which attain a height of over 24,000 feet. Among the chief of these are **Nanga Parbat** in Kashmir, 26,182 feet; **Nanda Devi** in the United Provinces, 25,661 feet; **Mount Everest**, 29,002 feet; **Kinchinjunga**, 27,815 feet; and **Dhaulagiri**, 26,826 feet, in Nepal. (See Map, p. 79.)

The Himalayas are the loftiest mountains in the world, and to this fact they owe their name, which means "the abode of snow". They sweep in a graceful curve through twenty degrees of longitude, between the bend of the Indus on the west and of the Brahmaputra on the east; but it must be remembered that not more than one-third of this vast mountain system is known with any degree of accuracy.

The state of Nepal, which occupies 500 miles of the Himalayas, is almost an entirely unknown land, the Government of India having acquiesced in the policy of exclusion adopted by its rulers. What we

know about the Nepalese part of the Himalayas is derived from information obtained during the expedition to Nepal in 1816.

Bhutan, to the east of Nepal, from which it is separated by Sikkim and the Chumbi Valley, has of late years been seldom visited by Europeans. Farther east still, the natives who inhabit the Himalayan regions, the Akas, Miris, Abors, &c., are among the fiercest of savages. With them it is scarcely possible to have any peaceful intercourse. Expeditions to punish them for their murderous raids on the peaceful inhabitants of the lower valleys have brought back some information regarding the country; but, at present, anything in the way of peaceful scientific exploration is impossible.

Everything connected with the Himalayas is on a gigantic scale, mountains and valleys alike. The passes by which the range can be crossed are none of them under 17,000 feet in height, and most of them are very much higher. For commercial purposes, therefore, the passes are almost useless. They are interesting historically, because their great height and the difficulty of crossing them have hindered India from ever being invaded from the north.

Within the hill region, communications are exceedingly difficult. The roads are mostly mere bridle-paths. The rivers, here flowing in deep gorges, are crossed by bridges of the rudest kind. These bridges are often formed of canes and twisted fibres kept in their place by ropes attached to the side of the chasms. Across these the natives, bearing their heavy loads of merchandise, pass without the slightest hesitation. Sheep, and in the higher parts yaks, are the beasts of burden.

### North-western Mountains

Exactly the opposite is true of the passes through the hills of the north-west and west. These hills, like all the Himalayas, are mostly of new rock, or of rocks of middle age, and they are cut through by several passes which can be used as trade routes. These passages, or routes, have been the roads by which, throughout the ages, conquering tribes have in turn invaded India.

They have, of course, been also the routes by which trade and communication between India and Europe have been carried on from the earliest times. The passes through the mountains of the north-west, the Khyber and others, lead to the Afghan part of the plateau of Iran, from which the roads to the west and to the north-west are easy.

The hills in the north of Afghanistan, which form part of the

main system, are the **Hindu Kush**. These are much less in height than the Himalayas, and they are crossed by several comparatively easy passes between north and south.

On the north the Hindu Kush unite with the mountain mass of the Pamirs, from which radiate not only the Himalayas forming the southern scarp of the Chang or tableland of Tibet and the Kuen Lun, which forms the northern face of that tableland, but also the Karakorum, a range of lofty mountains which crosses the tableland to the north of Kashmir. This range contains some of the loftiest summits in the world, **Godwin Austin** being considered only inferior in height to Mount Everest. The Karakorum are crossed by several mountain passes of no great difficulty and not rising much above the lofty surrounding plains. Among these are the Karakorum, Mustagh, and Hispar passes. The Karakorum, like the Himalaya, are covered with glaciers, some of which are of vast extent.

### Surface of North-western Mountain Region

On the west of India the **Sulaiman** and **Hala** or **Kirthar Mountains** separate Afghanistan and Baluchistan from India. These form the eastern branch of a loop of folded mountains hanging from the main chain of the Alpine-Himalayan System and surrounding the internal drainage areas of Iran, **Seistan**, and **Baluchistan**. They are more correctly, however, looked on as the eastern escarpment by which the Plateau of Iran sinks to the Indo-Gangetic plain. In the western branch of the loop is the volcano of **Koh-i-Taftan**, over 13,000 feet high, on the borders of Baluchistan and Persia.

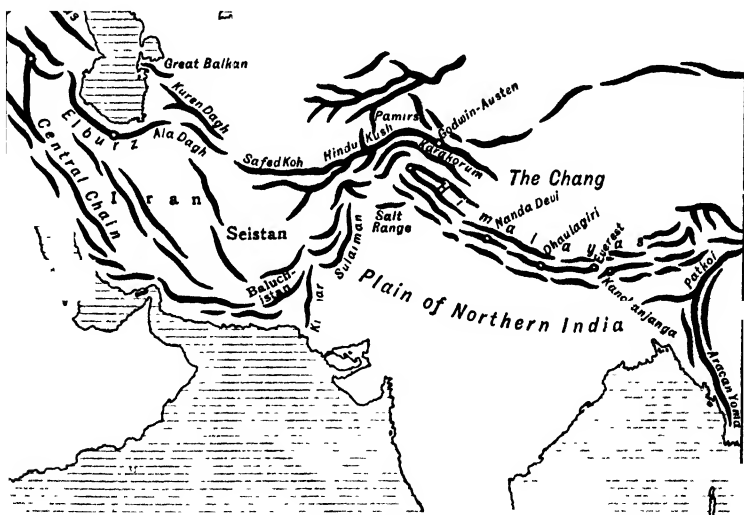
The continuation of the Hindu Kush, the **Koh-i-Baba** and the **Safed Koh** divide Afghanistan into two parts, a Northern and a Southern. The northern includes **Herat**, **Afghan-Turkestan**, and **Badakshan**, and the southern the two provinces of **Kabul** and **Kandahar**. Spurs from these mountains stretch out south-westwards towards Kandahar, enclosing between them numerous valleys which drain into the **Hamun-i-Helmand**, the **Helmand Marsh** or **Lagoon**.

The plains in Afghanistan are of small extent. Of the three most important, the first lies between the foot of the northern spurs of the Hindu Kush and the Oxus. This is the great plain of **Afghan-Turkestan**; the second occupies the lower part of the course of the **Heri Rud**, the valley in which **Herat** stands. The third includes the lower part of the course of the **Helmand**, with the extensive and once fertile

plains of Seistan, and it also includes the desert which lies to the west and south of Kandahar.

The southern part of the tableland is like the northern. It is a rocky, barren, mountain region, across which run numerous gorges, the mountains alternating here and there with great stretches of desert. It is known as Baluchistan, and may physically be considered to consist of upper highlands, lower highlands, deserts, and plains. West of

English Miles  
0 100 200 400 600 800



Eastern Alpine-Himalayan System

the Sulaiman Mountains there are four parallel ranges: the **Kharan** and **Chagai Hills** to the north, having between them the inland drainage area into the **Hamun-i-Lora**; and between them and the **Makran** Central range, the inland drainage area which sends its waters into the **Hamun-i-Mashkel**.

The **Sulaiman Mountains**, on the east of Baluchistan, form, with the **Safed Koh** and other continuations of the **Hindu Kush** to the north and the **Hala Mountains** to the south, the eastern edge of the Plateaux of **Iran**, which is, next to **Tibet**, the largest elevated tract of land on the surface of the earth. They extend for about two hundred miles south

of the Gomal Pass, and separate Baluchistan from the North-west Frontier Province and from the Punjab. The chief summit of the Sulaiman Mountains is **Takht-i-Sulaiman**, "Solomon's Throne", which rises to a height of a little more than 11,000 feet. These mountains are continued southwards by the **Kirthar** or **Hala Mountains**, which, breaking up towards the south-west, form valleys like **Las Bela** opening southwards.

### North-eastern Mountains

As the Himalayas may be said geographically to end on the west where the Indus makes its way through the chain, so in the south-east they may be said to end where the Brahmaputra turns round them, flowing first south and then west.

This corner of India forms the province of **Assam**, the north-eastern province, which may be considered to consist of three divisions: the valley of the Brahmaputra from where it rounds the Himalayas to nearly the junction with the Ganges; the valley of the Surma or Barak, called nearer its mouth the **Meghna**; and the hill region, consisting of the **Garo, Khasi, Naga, and Patkoi Hills**. The first three groups are at right angles to the latter, which, with its continuation the **Lushai Hills**, separates Assam from Burma. The **Garo, Khasi, and Naga Hills** separate the valley of the Brahmaputra from the valley of the Surma. These old **block** or **residual** mountains, that is, mountains left standing by the sinking or wearing away of neighbouring blocks, reach a height of between 6000 and 7000 feet. From the plain on the south they rise very steeply.

Parallel ranges of folded mountains similar in structure to the Himalayas, running generally in a southerly direction and separated by valleys opening to the south; stretch from the eastern end of the tableland of Tibet through Burma, which is split up by these ranges into a number of separate valleys.

In the west is the district of Arakan, bounded on the north by the **Lushai Hills** and on the east by the **Chin Hills**, a district made up of forest-covered ridges of sandstone. Farther east the valleys of the Chindwin, Irawadi, and Sittang form a strip of comparatively low country that widens out southwards into the broad flat delta of the Irawadi. Except on the south this central level stretch is enclosed on all sides by hills, on the west by the **Chin**, on the north by the **Kachin**, and on the east by the **Shan** and **Karen Hills**.

These seem to have been forced up under pressure from the east against the old rocks of the **Assam tableland**. That tableland probably formed a detached part of the great con-

continent which in early times stretched from the Deccan, or even from Western Australia, to what is now the Atlantic Ocean—some say across it so as to include the north-west corner of South America—and which embraced Western Australia and South Africa as well as the Deccan.

The whole of northern Burma is mountainous, and the valleys between the successive ranges of mountains are often very narrow. The folded mountains of western Burma are continued through the Eastern Archipelago, of which system they form a part. These folded mountains, which seem to have been pushed south by pressure against the southern Chinese platform as the Carpathians in Europe were pushed south by pressure against the southern Russian platform, connect through the East Indian Islands the Alpine-Himalayan fold system of Eurasia with the Circum-Pacific folded-mountain system of Eastern Asia and America.

### Surface of Continental Plain

South of the Himalayas is the great Plain of Northern India, which forms a part of the **Mid-world Depression**, a depression of very great geographical interest which stretches round the world from west to east at no great distance from the Tropic of Cancer. The line of the Panama Canal and the Caribbean Sea form a part of it.

The plain of Northern India, or, as it is often called, the Plain of the Ganges and Indus, or simply the Indo-Gangetic Plain, covers an area of 500,000 square miles, and includes what are the most fruitful and populous, as well as historically the most interesting parts of the Indian Empire.

So thoroughly broken up are the rocks that form the soil over this great alluvial plain, that it is said to be possible to walk from the mouth of the Ganges through the Punjab and down the Indus to its mouth, a distance of over 2000 miles, without finding even the smallest pebble.

The Indo-Gangetic Plain is divided into two parts by a range of very old hills which runs north-eastward across the plain almost to Delhi, the capital, and which divides the Plain of the Ganges from the Plain of the Indus.

The Plain of the Ganges, save for the **Rajmahal Hills** in Bengal where the Ganges turns towards the south-east, is a vast alluvial level plain cultivated almost to the limit of its capacity.



The Plain of the Indus may be more properly said to consist of the Punjab in the north and of Sind farther south.

The province known as the Punjab consists of the western portion of the Indo-Gangetic plain, which extends as far westward as Lahore; of dry south-western plains reaching southward to Sind and Baluchistan; of the Himalayan region between the plain and the Himalayan mountains, and of the arid plateau of the Salt Range. The Punjab proper consists of the five Doabs or inter-riverine regions, and forms one vast alluvial plain.

The slope of the Punjab is towards the south-west and is, like the slope of the Ganges valley, very gradual.

Almost every part of Sind, which lies to the south-west of the Punjab, has at one time or other formed part of the banks or of the channel of the Indus, which runs through it from north-east to south-west.

Great quantities of solid matter are brought down from the hills by the Indus and its tributaries; and, as the river in the lower part of its course decreases in size on account of evaporation, there is a constant deposition of silt along its channel or channels. This raises the bed of the river above the level of the surrounding country; and incidentally makes irrigation from the river comparatively easy. It leads also, as a moment's reflection will make manifest, to frequent changes in the channel of the river. Naturally, the best watered, and therefore the most fertile, part of Sind is the land near the river.

Great government irrigation works have been constructed on the Indus and its tributaries, whereby millions of acres of land, that would otherwise have remained desert, have been brought under cultivation.

The Aravalli Hills divide Rajputana into a north-western and a south-eastern part. The latter belongs to the basin of the Ganges and is drained mainly by the **Chambal** and its tributaries. The former is a tract of wind-blown sand, a desert region, which may be considered part of the Indus basin. Its chief stream is the **Luni**, which falls into the head of the Rann of Cutch.

Everywhere in the Thar or desert, long straight ridges of sand-dunes rise above the surface to a height sometimes of fifty or even of a hundred feet, their sides water-scored and their summits two or three miles in length.

Kathiawar, farther south, is a square peninsula between the Rann of Cutch and the Gulf of Cambay. Kathiawar seems to have been at one time an island or a group of islands, and rises from the coast to a central tableland. The surface is for the most part undulating. The peninsula is of volcanic origin, and some of its granite hills reach a height of between three and four thousand feet.

Cutch, to the north of Kathiawar, is almost completely separated from the rest of India, on the north by the Great Rann, a barren waste of sand and salt where only the wild ass can thrive; on the east by the Little Rann, and on the south by the Gulf of Cutch. It is, on the whole, a barren, treeless, rocky region with hills rising in some places to a height of nearly a thousand feet.

### Surface of Central India

The **Vindhya Mountains** stretch across Central India from west to east, almost in the line of the Tropic of Cancer. They form the water-parting between the rivers that join the Ganges—the Chambal, Sindi, Betwa, Ken, and Tons flowing north, and the Son flowing north-east—and those that flow west to the Arabian Sea—the Mahi, Narbada, and Tapti, and south-east to the Bay of Bengal—the Mahanadi and its tributaries.

They consist of straight lines of flat-topped hills, separated by deep ravines sloping gently northward toward the Ganges, and falling abruptly to the Narbada.

They are separated by the valley of the Narbada from the Satpura Hills, which lie to the south of that river, and are in so many ways like the Vindhya that they were often formerly included under that name. The Satpura may be regarded as stretching from west to east across Central India for a distance of 700 miles.

From the low-lying plains of the Indus and Ganges the land rises towards the south to the tableland of **Malwa** in the west and of **Bundelkhand** in the east.

The Vindhya forms really the southern escarpment of the plateau of Malwa, and its southern branch, the Kaimur Hills, runs through Baghelkand and the United Provinces into Bihar and Orissa. The **Kaimur** rise like a wall to the north of the Son Valley. The **Bhanrer** or **Panna Hills**, which form the eastern face of the Vindhya escarpment, are a continuation of the Kaimur.

The **Satpura** mountains, which touch the Vindhya at Amar-kantak and separate the Narbada from the Tapti, are similar in structure and in height to the Vindhya, both rising to a height of between four and five thousand feet.

A stretch of comparatively low land crosses the peninsula from east to west along the valleys of the Tapti and the Mahanadi, and across the upper valley of the Godavari. This stretch of comparatively low country, which nowhere reaches a height of 1500 feet, separates Central India from the Deccan proper.

### Surface of the Deccan

The name **Deccan**, which is a corruption of a Sanskrit word meaning southern, is sometimes applied to the whole peninsula south of the Indo-Gangetic plain, sometimes only to the southern part of it, excluding

the tablelands and mountains of Central India, and sometimes only to the central stretch of the peninsula between the Narbadda and the Kistna.

South of the Tapti is the Deccan, a triangular tableland, highest towards the west, and sloping gently to the east and south-east.

The **Eastern Ghats**, as the eastern edge of this tableland is called, are of no great height, and have scarcely any slope towards the west. Roughly they may be said to run parallel to the eastern seaboard and to form a broken line of small confused heights, the average altitude of which is little more than 2000 feet.

Nowhere do the Eastern Ghats reach a height of 6000 feet. The chief peak is **Mahendragiri** in Ganjam, in the north-east of the Madras Presidency, and it was proposed to build a sanatorium for Calcutta on it. **Mahendragiri** is nearly 5000 feet high.

Behind the Eastern Ghats the tableland rises to the west. The Deccan is made up of open upland valleys and broad plains from which rise strangely-shaped, square-topped hills. In some parts of the Deccan the brown plains are dotted with bold hills, in other parts with granite tors of great size. The central highlands of the Deccan are the region of the productive black cotton soil, which is so fertile that in some cases it is said to have produced crops continuously and without manure for over a thousand years.

The **Western Ghats** form a real ridge, rising in the south in the Nilgiris to a height of 8000 feet. South of Bombay the seaward face of the Western Ghats is forest-clad, and there are few passes into the interior.

The **Western Ghats** formed probably the water-parting between the east-flowing and west-flowing streams that crossed the ancient Indo-African Continent. They have a general elevation of fully 3000 feet, and the steep forest-clad cliffs and square-crested flat-topped peaks make the scenery striking and remarkable. Among the highest peaks are **Kalsubai**, **Harischandragarh**, and **Mahabaleshwar**. Farther south they reach their greatest height in **Kudremukh** on the borders of Madras and Mysore, a mountain over 6000 feet high. In the north there are several roads from the coast into the interior.

To the south, the Ghats rise in the **Nilgiris** to almost their greatest height. There **Dodabetta** attains a height of nearly 9000 feet (8760 feet). Still farther south, separated from the Nilgiris by the Palghat Gap, are the **Anaimalai**, or **Elephant Hills**, which end in Cape Comorin. In **Anaimudi**, which is 8837 feet high, the western scarp culminates. These southern highlands of India are repeated in form and structure in the highlands of Ceylon.

The Nilgiris and the Anaimalais and the hills in the centre of Ceylon are rounder in outline, and generally softer than the Himalayas or the hills of Afghanistan or Baluchistan. This rounded character is another evidence of the fact that these hills have been much longer exposed to the action of denuding agents, in other words that they are much older than the Himalayas. They differ too from the sharp, square-crested peaks which are so characteristic of the north-western part of the peninsula.

The Nilgiri Hills are usually spoken of as the highest in the peninsula. To the south of the Nilgiris, which may be regarded as the junction of the Eastern and Western Ghats, the Anaimalai Hills, which in Anaimudi Peak rise 100 feet higher than the Nilgiris, and the Cardamon Hills, continue the line of the Western Ghats to Cape Comorin. While from them the Palni and Salem Hills branch off to the north-east.

Between the Eastern Ghats and the Bay of Bengal there is a broad stretch of fertile coast land known as the Coromandel Coast. The narrower level part between the Ghats and the Arabian Sea is called the Malabar Coast.

### Surface of Ceylon

The Crown Colony of Ceylon, which is politically no part of the Indian Empire, is so closely connected with the Deccan in structure, surface features, and climate, that it must be regarded as a south-eastern extension of it. It is separated from India by two narrow passages—one, known as the Manar on the Ceylon side, permits only the passage of small boats; while the other, the Pamban Channel, lets vessels drawing ten feet of water through. What are known as Adam's Bridge and the island of Rameswaram nearly join the island to the mainland.

The mountains of Ceylon are for the most part grouped together near the centre of the island, and may be said to run from the north-east to south-west.

The highest peak, Pidurutalagala, rises to a height of 8300 feet, but Adam's Peak, though nearly a thousand feet lower, is the most noted mountain in the island. There are few detached peaks, the most famous being Mihintale.

The central mountains of the island are surrounded by a broad fringe of plain which varies in breadth on the southern part of the island from thirty to eighty miles, and to the north occupies nearly half the island. The Nuwara Eliya Plain, the sanatorium or health resort of the island, is more than 6000 feet above sea-level.

## RIVERS OF INDIA

The rivers of India may be arranged according to where they end, as: (1) rivers that fall into the **Arabian Sea**; (2) rivers that flow into the **Bay of Bengal**; and (3) **continental rivers**, that is, rivers that do not reach the sea, but end in a marsh or lake.

They may also be arranged according to where they have their source. This mode of arrangement would group the rivers of India as: (1) **Himalayan**, (2) **Eastern mountain border rivers**, (3) **Western mountain border rivers**, (4) **Vindhyan or Central Indian rivers**, and (5) rivers from the **Western Ghats**.

The central axis of the Himalayas, though it reaches an average height of fully 20,000 feet, does not form the main water-parting. The water-parting lies farther north, probably in the eastward continuation of the **Mustagh** or **Karakoram** mountains which cross Tibet to the north of the basins of the Indus and the Brahmaputra.

If we grouped the rivers according to the part of the country they water, we would arrange them into three groups: (1) the great **Rivers of Northern India**, the *Indus* on the west, and the *Ganges* and *Brahmaputra* on the east; (2) the **Rivers of Central India**, the *Luni*, *Mahi*, *Narbada*, *Tapti*, and *Mahanadi*; (3) the **Rivers of the Deccan**, the *Godavari*, *Kistna*, *Penner*, *Palar*, *Ponniar*, *Cauvery*, and *Vaiga*.

The complicated border rivers may be arranged as *North-western* and *North-eastern*. The north-western include: (1) those that flow east into the Indus—the **Gomal**, **Kurram**, **Kabul**, &c.; (2) those that flow south into the Arabian Sea, draining the triangular valley of Makran, the coast province of Baluchistan—the **Porali**, **Hingol**, and **Dasht**; and (3) the inland drainage rivers—the **Mashkel** and **Lora** in Baluchistan, and the **Helmand**, **Hari Rud**, and **Murghab** in Afghanistan.

On the **north-east** are the rivers of the Burmese borders and of Burma. These include the rivers flowing into the Brahmaputra, the **Dibang** and **Surma**; the rivers flowing to the northern part of the Bay of Bengal, of which the chief is the **Kaladan**; and the rivers that, after draining Burma, flow into the Gulf of Martaban—the **Irawadi**, **Sittang**, and **Salwin**.

It will be seen, therefore, that the most satisfactory way of treating the rivers of India is to consider them in connection with the great natural regions.

## GANGES VALLEY

The **Ganges** and **Brahmaputra** do for the eastern section of the Himalayas (the part to the east of Simla) what the **Indus** and **Sutlej** do for the western—drain both slopes.

In the eastern system the Brahmaputra may be said to take the place of the Indus proper, and the Ganges the place of the Sutlej; but here the resemblance of the systems ceases. The Ganges, unlike the Sutlej which receives no tributaries on its left bank, besides the tributaries from the Himalayas, receives the surplus waters of a large area to the south. It drains the northern slopes of the Vindhya Mountains.

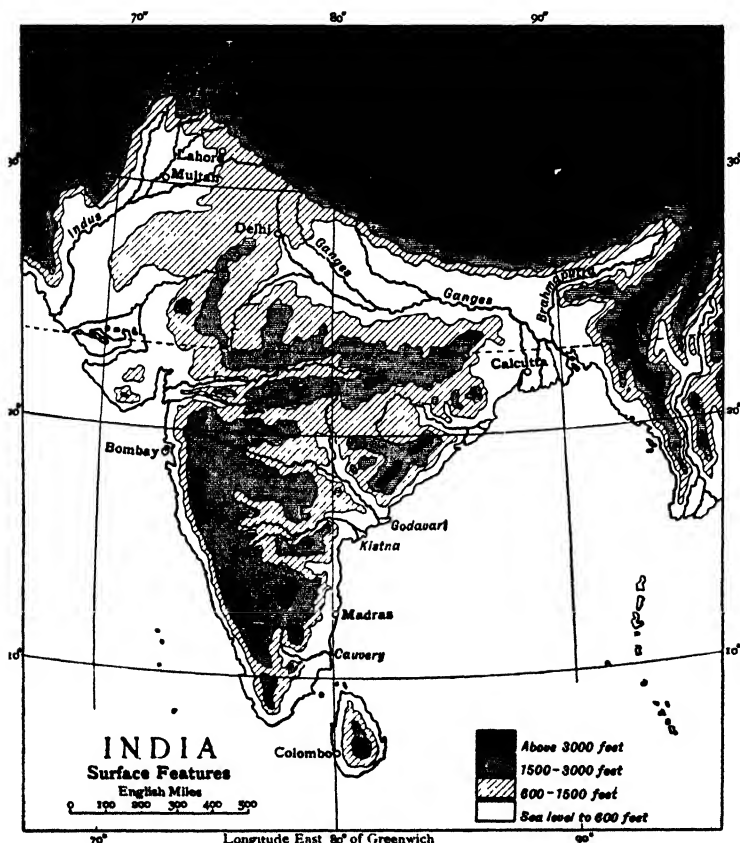
The total length of the Ganges is 1550 miles. It rises near **Gangotri**, at an elevation of 13,800 feet above the sea, in the Central Himalayas, in an ice-cave known as the Gai-mukh or Cow's Mouth, not far from where its great tributary the Jumna rises. It is known at first as the **Bhagirathi**, and for the first 180 miles of its course is a mere mountain torrent. It is joined below **Tehri** by the **Alaknanda**. At **Hardwar** a vast system of irrigation canals has its beginning. These at some seasons carry off almost the whole volume of its waters. Hardwar is a place of pilgrimage resorted to annually by thousands, and once every twelve years by hundreds of thousands of pilgrims.

The object of the pilgrimage is to bathe in the sacred Ghat Hari-kacharan or Hari-ka-Pairi. At the Kumbh Mela, or specially holy twelfth year in 1903, there were no fewer than 400,000 pilgrims present.

No other river in the world can be compared for sanctity to the Ganges. From its source to its mouth every yard of its course is sacred. To bathe in its waters is to cleanse from sin; to die or to be cremated on its banks is to attain everlasting peace. If Egypt is rightly regarded as the gift of the Nile, the north-eastern part of the plain of India may no less justly be looked upon as the gift of the Ganges. The majestic flood which it rolls down to the Bay of Bengal does not become a destructive torrent during the rainy season, nor even in the hottest summer does it fail. Scarcely any embankments are required to keep the Ganges in its channel, and year by year the silt which it spreads over the fields renders them matchlessly fertile. The irrigation canals which draw from the Ganges their supply of water make thousands of square miles of country prolific that would without this be nearly desert.

The **Ganges** flows first south-east to its junction with the Jumna, then east-north-east till it meets the Gogra. From its junction with the Gogra it winds in a generally eastern direction past the Rajmahal Hills, a spur from the Vindhyas. In this part of its course it receives two other important tributaries, the Son on the right bank, which drains the north-eastern Vindhya, and the Gandak on the left from Nepal. The Gandak is

scarcely inferior in volume to the Ganges itself. Skirting the Rajmahal Hills, the Ganges branches out over the level country which forms its delta. The main channel, under the name of



**Padma**, runs in a south-easterly direction to Goalundo, where it unites with the **Jamuna** or main stream of the **Brahmaputra**.

The **Jumna**, the chief tributary of the Ganges on the right bank, rises on the northern slopes of **Nanda Devi**, one of the

most famous peaks of the Himalayas, at a height of nearly 11,000 feet above sea level. Jamnotri, where it has its source, is no great distance from Gangotri, the source of the Ganges; but the Jumna flows for 860 miles through the mountains and over the plains of northern India before it joins the Ganges at Allahabad, one of the great places of pilgrimage of the Hindus.

The Jumna brings with it the waters of the **Chambal** from the Malwa Plateau, and the western part of the Vindhya, increased by the **Banas** from the eastern slopes of the Aravalli. It brings also with it the **Sind**, **Betwa**, and **Ken** from the northern slopes of the Vindhya.

Far below the junction of the two streams, the clear blue waters of the Jumna can be distinguished from the yellow, silt-laden waters of the Ganges.

The Vindhya and their northern slopes are of old hard rock, and the streams that flow over them are naturally, therefore, much less heavily silt-laden than the streams that flow over the softer hills to the north.

The **Gumti**, which joins the Ganges on the left bank below Benares, drains with its tributaries about 7500 square miles of the United Provinces, an area almost equal to the whole of Wales.

Unlike the Ganges itself, the Gumti is liable to flooding from the heavy rains that fall in its basin, and the floods sometimes do considerable damage. Unlike the Jumna and Ganges, the Gumti is not used for irrigation.

The **Gogra**, the great river of Oudh, rises, like the Sutlej and Indus, north of the main chain of the Himalayas. Indeed the Gogra, Sutlej, Indus, and Brahmaputra seem all to rise in the same mountain knot and at no great distance from each other.

Under the name of the Kauriala the Gogra flows through Nepal. Shortly after entering India it receives on the right bank the **Sarda**, and farther down it receives on the left the **Rapti**.

The river is navigable before it reaches India, and till lately the traffic in grain, spices, and timber from Nepal was very important. Part of this traffic is now carried over the Bengal and North-Western railway.

Below the junction of the Ganges and Gogra the **Son** falls



into the Ganges on the right bank, and the **Gandak** on the left. The **Son**, which rises close to the source of the **Narbada** at **Amarkantak**, drains the north-eastern slopes of the **Vindhya Hills**.

It has a length of nearly 500 miles, and is one of the most sacred rivers of the Hindus. Its course is first north, then east, and then north-east. The river is used for floating down rafts of bamboos and some timber. It is also used for irrigation purposes, supplying the **Son Canals**, as the irrigation works of South Bihar are called.

Farther east the **Kosi** from the Himalayas falls into the Ganges on the left bank; and on the right bank, and in the delta, the **Bhagirathi** from the **Rajmahal Hills**, and the **Damodar** from the **Chota-Nagpur plateau** and the eastern scarp of the **Vindhyas** join the Ganges.

### The Ganges Delta

Three great rivers unite to form the delta of the Ganges: the Ganges and the **Brahmaputra**, which join at **Goalundo**, and the **Surma** or **Barak** or **Meghna**, lower down—the **Meghna** being the name given to the principal channel.

The delta covers an area of no less than 50,000 square miles, and is built up of the silt brought down by the two great rivers from the Himalayas and by the **Meghna** from the hills of **Assam** and of **Upper Burma**.

Where not marsh and jungle the delta is a vast stretch of rice-fields, each surrounded by its fringe of bamboo- or palm-trees. Everywhere the land is crossed by channels of the two great rivers; and near the coast of the **Bay of Bengal** is the low-lying swampy jungle called the **Sundarbans**, given over almost entirely to serpents, crocodiles, tigers, and other wild beasts. It gets its name from one of the most characteristic and most abundant of the trees that grow in it.

### The Brahmaputra Valley

The **Brahmaputra**, the great river of north-eastern India and of Tibet, has a total length of 1800 miles and drains an area of over 350,000 square miles. The source of the **Tsan-po**, the name given to the Tibetan portion of the **Brahmaputra**, lies a little to the east of **Lake Manasarowar**, and not far from the sources of the **Indus**, **Sutlej**, and **Gogra**. For fully half its length the **Brahmaputra** flows parallel to the Himalayas, in a narrow valley which separates the main chain of the Himalayas

from a more northern ridge which runs parallel to it across Tibet and seems to form the chief water-parting.

The **Tsan-po** has been followed eastward from its source for nearly 900 miles, but it has not been followed down to a point where it is known for certain to be the same river as the Brahmaputra. Yet there seems little doubt that the two rivers are the same, and that under the name **Dihang** the Tsan-po skirts the eastern edge of the Himalayas. In the extreme east, before it turns towards the south-west, the Dihang receives the **Luhit** or Zayul Chu from the hills to the east. The Luhit is itself, before it joins the Dihang, increased by the waters of the **Dihing** from the south and of the **Dibang** from the north.

After its junction with the Luhit the Brahmaputra flows south-west across Assam, receiving, as one would expect, numberless tributaries from the rainy southern slopes of the Himalayas, and from the even moister hills of Assam and of the Burmese frontier. Of the tributaries from the right or north bank of the river the chief are the **Subansiri**, the **Manas**, the **Torsa** or **Dharla**, and the **Tista**; of those on the south or left bank of the river the chief are the **Buri Dihing**, the **Disang**, the **Jhanzi**, **Dhansiri**, and **Kapili**. All these tributaries of the Brahmaputra are navigable and are of very considerable commercial importance. The Brahmaputra itself is navigable for over 800 miles from its mouth. The vast expanse of water which the Brahmaputra brings down from the mountains of Tibet is heavily silt-laden, and owing to the deposition of silt the river frequently changes its channel. From the time it enters Indian territory the Brahmaputra continues to throw off channels or branches on both sides of its course. These branches rejoin the main stream after a separation sometimes of many miles. One of these divergent channels is the **Kalang**, which after passing through the district of Nowgong rejoins the Brahmaputra a little above Gauhati.

In its usefulness for commercial purposes, and in the help it gives the farmer, the Brahmaputra ranks next to the Ganges and the Indus.

There is no need to use its waters for irrigation, for the lower part of the course of the Brahmaputra is through a region of heavy rainfall; but the silt which it spreads over the fields on its banks renders them exceedingly fertile. Year after year these fields yield abundant crops of jute and rice, and they never seem to become exhausted. A great trade in timber, tea, and rubber is carried on by the Brahmaputra.

The united Ganges and Brahmaputra are joined nearer their mouth by the **Meghna**, a broad, navigable river from eastern Bengal and Assam, which drains the western slopes of the hills between Bengal and Burma, and gives its name to the lower part of the united streams.

The name Meghna is properly given only to the combined channel

of the Ganges and Brahmaputra where it turns due south after receiving the Surma or Barak from the hills that divide Upper Burma from Assam. The Meghna, thus understood as the lower part of the combined channel, runs almost due south. Nowhere are its channel and banks clearly marked, and the united flood of the three great rivers rolls to the sea a volume of water of great depth and velocity. It is navigable by native boats and by river steamers throughout the year; but owing to the shifting sandbanks that frequently form in it, the navigation is anything but easy. The tides on the Meghna are more remarkable than those of any other Indian river. Their regular rise is from 10 to 12 feet, and at spring tides the bore rushes up the channel at a rate destructive to the shipping. With a south wind blowing at such seasons the tides are particularly remarkable. A noise like thunder is heard from seaward, and suddenly the tidal wave appears in sight. It shows itself as a foam-crested wall of water often 20 feet high, and rushes up the channel at the rate of 15 miles an hour.

The Surma or Barak, to the lower part of which the name Meghna is sometimes given, rises in the slopes of the border range dividing Manipur from Burma.

In the upper part of its course as the Barak it flows through narrow valleys, formed by hills rising steeply from the river bank. In Sylhet it divides into two branches. The northern, known as the Surma, flows past the foot of the Khasi and Jantia Hills, which it drains, and then turns towards the south and reunites with the southern branch, which is known at first as the Kusiara, and which, after itself dividing and reuniting, resumes its original name, the Barak, and rejoins the Surma. The united waters fall into the old stream of the Brahmaputra near Bhairab Bazar, and the name Meghna is given to the channel which runs almost due south between Dacca and Chittagong. The name Meghna is given also to the lower part of the main channel by which the Ganges and Brahmaputra discharge their surplus water into the Bay of Bengal.

## INDUS VALLEY

As the Ganges and the Brahmaputra drain the eastern part of the Himalayas and water the eastern part of the great plain that separates those mountains from peninsular India, so the Indus and its tributaries drain the western part of the Himalayas and of the plain. An examination of the rainfall map of India (p. 111) shows that along the Himalayas and in the great plains between the mountains and the peninsula the rainfall steadily decreases as we go from east to west. This naturally leads one to conclude that the rivers in the western part are

less full than those in the eastern, and that the country generally stands in greater need of irrigation.

The Indus rises in a lake district in Western Tibet north of the main chain of the Himalayas, not far from where its great tributary the Sutlej rises; but, unlike the Sutlej, it turns to the north-west, until at Gilgit it turns at right angles and rounds the western end of the Himalaya Mountains.

The Indus is said to rise on the northern slopes of the sacred **Kailas Mountain**. To the Aryan invaders of India this mountain was what **Mount Olympus** was to the Greeks, the dwelling-place of the gods. The Indus is said to rise at a height of 17,000 feet above sea-level. Its course may be divided into two almost equal portions, from its source to Attok in the Punjab, and from Attok through Sind to the Arabian Sea.

In the upper part of its course, among the streams it receives are the **Ghar** and **Zaskar** on the left bank from the Himalayas, the **Shyok** and **Gilgit** from the Karakoram, and the **Kabul**, with the **Kunar** and **Swat**, from the Hindu Kush.

After reaching the North-west Frontier Province it receives on the right bank the **Kurram**, with its tributary the **Tachi**, and the **Gomal**, with its tributary the **Zhob**. On the left bank the Indus receives the **Sohan** from the Rawalpindi district, and turning almost due south, first between the North-west Frontier Province and the Punjab, and then through the western part of the Punjab under the name of the **Panjnad**, it receives the united waters of the five rivers.

After leaving the Punjab the Indus follows a south-westerly course through Sind for nearly 500 miles.

As Egypt is the gift of the Nile, so Sind is the gift of the Indus. Like the Nile, the Indus rises and falls regularly. It begins to rise in March, reaches its greatest height in August, and begins to subside in September. The river rises sometimes more than 20 feet above its lowest level. Its delta covers an area of about 3000 square miles, that is, it is nearly as large as the whole county of York. It is almost perfectly level and treeless save for the mangrove and the tamarisk. It resembles, therefore, as will be easily seen, the delta of the Nile rather than that of the Ganges.

The marshy parts of the delta form excellent pastures; and, where cultivation is possible, the rice crop is abundant. The soil of the delta is much less fertile than the soil of the delta of the Ganges; but the climate is cool and bracing in the winter months, intensely hot in summer, and very unhealthy when the river is in flood.

The depth of the river varies from 4 to 24 feet, and the breadth from a quarter of a mile to fully a mile. On an average the temperature of the water is 10° below that of the air. The Indus has again and again changed its channel, though from Attok to the sea its course is through a region of deficient rainfall. Occasionally disastrous floods caused by the melting of the vast glaciers among the higher Himalaya and Karakoram ranges sweep down the river. In Sind, 5000 square miles are irrigated by the Indus.

The total length of the Indus is about 1800 miles, nearly the same as that of the Brahmaputra, and the area of its basin is estimated at over 370,000 square miles.

The Indus receives many tributaries from the west, as has been shown; but these are chiefly of interest because the valleys through which they flow are the ways across the mountains used in all ages both by traders and invaders.

### The Five Rivers

Between the Indus and the **Sutlej**, which joins it midway between Attok and its mouth, is the flat, fertile, triangular plain called the Punjab, across which, to join the Sutlej, flow the **Jhelum**, **Chenab**, **Ravi**, and **Beas**.

Like the Indus, the **Sutlej** rises to the north of the main chain of the Himalayas. All the great rivers of India, indeed, and all their principal tributaries, rise in the mid-Himalayas at no great distance from each other. The Sutlej, after flowing north-west like the Indus, breaks its way through the Himalayan barrier, and after flowing west through the Kanawar, a lateral valley in Bashahr State between the main chain and the outer Himalayas, passes through the latter range. Then it flows west and south through the Jaswan Dun, and piercing the Siwaliks at Rupar, reaches the plain. At Rupar the Sutlej turns almost due west, and continues in that direction till it meets the Beas, which joins it on the right bank. From its junction with the Beas the united stream flows in a south-westerly direction to its union with the Chenab, which joins it on the right bank, and which brings with it the waters of the Ravi and of the Jhelum, the river of Kashmir.

Soon after the junction of the Sutlej and Beas, the Upper Sutlej system of canals is taken off for irrigation purposes, while another system of irrigation canals is formed lower down near the junction of

the **Sutlej** and the **Chenab**. All the year round the **Sutlej** is navigable for small boats. The people never call the river the **Sutlej** after it leaves the hills.

All the rivers of the Punjab get their water supply from the melting snows of the Himalayas, and are usually in flood in the late summer, that is, about July or August. The **Sutlej** or **Hakra** seems frequently to have changed its course. At one time it fell into the Rann of Cutch, and there is every reason to believe that the **Sutlej** is the lost river of the Indian desert, the **Saraswati**, the river that turned the sands of Sind into a garden.

The **Chenab** rises in Jullundur among the snows of the Himalayas, at about 16,000 feet above sea-level, and at no great distance from the place where its eastern tributary, the **Ravi**, has its source.

Two rivers, the **Bagha** and the **Chandra**, are its headwaters. These, after their union, flow in a north-westerly direction through Chamba and a part of south-eastern Kashmir. The river then runs first south, then west, then again south, and makes its way through the foothills of the Himalayas, some distance to the west of Jammu. It is there joined by the **Tawi**, the river on which Jammu stands. From its entrance on the plain the course of the **Chenab** is south-west till it joins the **Sutlej**.

It is joined on the left bank by the south-west-flowing **Ravi**, which receives on its right bank the **Degh** and other streams from Kashmir. Farther up the **Chenab** is joined on the left bank by the **Jhelum**.

The **Jhelum** rises in the north-east edge of the valley of Kashmir, and is the most westerly of the five rivers to which the Punjab owes its name. It flows north-east through the vale of Kashmir, passes the town of Srinagar and falls into the **Wular Lake**, the largest and the most beautiful of the lakes of Kashmir. After leaving the **Wular Lake** the **Jhelum** flows first south-west then north-west to the junction with the **Kishengangā**. Below its junction with the **Kishengangā** the **Jhelum** forms the boundary between Kashmir and Hazara and Kashmir and the Punjab, and flows in a narrow rocky bed. The stream here is not navigable, but it brings down quantities of timber. Near **Jhelum** it turns to the south-west as a navigable stream, and after a course of 100 miles it turns directly south and falls into the **Chenab**.

If we consider the prolongation of the western plain southwards to

embrace north-western Rajputana as well as Cutch and Kathiawar in the Bombay Presidency, we may consider the south-west-flowing Luni, Saraswati, Sabarmati, and Mahi to correspond to the Chambal and other rivers from Central India flowing north-east to join the Ganges. These streams would then be regarded as streams draining the north-western slopes of Central India and watering the extreme south-western part of the great plain.

### The Rivers of Central India

The broken and confused ranges running from east to west, to which the name Vindhyas is given, form the water-parting between the rivers that flow north-east through Central India to join the Ganges and those that flow west into the Arabian Sea, and the Mahanadi, which flows east into the Bay of Bengal. They consist largely of ridges of flat-topped hills, with wide stretches of plain between. The hills here and there are forest-clad.

The **Narbada**, which flows in a deep valley between the Vindhyas and the Satpura Hills, ranks next to the Ganges as the holiest river in India. The valley in which it flows in the upper part of its course is exceedingly narrow and almost straight, and from it, both on the north and on the south, there rise almost like walls the scarps of the Vindhyas and the Satpuras. After leaving the Central Provinces the Narbada widens out, and the estuary of the river is 13 miles wide. From its source to its mouth the river is an object of reverence, and **Amerkantak**, where the Narbada and the Son rise, is one of the most sacred spots in India. The part of the Narbada near its mouth is navigable for country boats, but the upper part is unnavigable owing to its speed; and, owing to the depth of the valley, the river is of no use for irrigation.

The **Tapti**, from which the Narbada is separated by the Satpura Hills, flows along the northern edge of the Deccan.

From the eastern edge of the Amarkantak uplands another important stream, the **Mahanadi**, flows south-east into the Bay of Bengal, and with its tributary the **Brahmani** forms a delta which, though smaller, resembles the delta of the Ganges and the Brahmaputra. There are in both the same wide stretches of rice-fields separated by rows of palms planted in the earth ridges between the fields.

South of the Tapti is the escarpment that forms the northern edge of the Deccan proper. The hills forming the escarpment overlook the plain which separates Central India from the Deccan and which nowhere rises to more than 1500 feet above sea level.

### Rivers of the Deccan

The **Godavari** rises in the Western Ghats to the north of Bombay, and flows generally in an eastern direction through Hyderabad, then south-east between Hyderabad and Madras, and south-east through Madras to the Bay of Bengal. It has a total length of 900 miles, and the scenery on it is most varied.

It receives numerous tributaries both on the right bank and on the left. The chief tributary on the right bank is the **Manjra**, and on the left the **Purna**, the **Pranhita** (the name given to the combined streams of the **Wardha**, **Penganga** and **Wainganga**), the **Indravati**, and the **Sabari**. The whole delta of the Godavari has been turned by irrigation works into a most fertile region; more than 1200 square miles have thus been dealt with.

The **Kistna**, like the Godavari, rises in the Western Ghats, and at something less than 40 miles from the west coast.

The **Kistna**, and its two great tributaries, the **Bhima**, which rises to the east of Bombay and joins the **Kistna** on the left bank, and the **Tungabhadra**, which rises in the west of Mysore and joins the **Kistna** on the right bank, are of little use for irrigation purposes.

The **Kistna** is used for irrigation only when it breaks through the Eastern Ghats and spreads over parts of the low sea-coast country.

A number of smaller rivers, the **Penner**, the **Palar**, the **Ponnaiyar**, the **Cauvery**, and the **Vaigai** water the southern part of Madras. Of these, the most important is the **Cauvery**.

The **Cauvery** rises in Coorg and flows generally south-east through Mysore and southern Madras. Its delta forms the fertile district of Tanjore, the garden of southern India. It is often called the **Dakshina Ganga**, or **Ganges of the south**.

The rivers of the Deccan, unlike the rivers of the Northern Plain, vary greatly at different seasons of the year. They flow, too, in deeper valleys cut in the hard crystalline rocks of the peninsula, and can therefore be less easily turned to account for irrigation. Their courses, too, are broken by rapids or waterfalls where they descend from the plateau to the coast plain, so they are of but little use for navigation.



### Rivers of Ceylon

The rivers of Ceylon are generally short and of little use for navigation. The largest is the **Mahawili Ganga**, which after a course of 150 miles falls into Trincomalee Bay. The principal other streams are the **Ginganga**, which falls into the sea near Galle; the **Kelani Ganga**, which enters the sea near Colombo; and the **Kala Oya**, which supplies the great Kalawewa tank.

### Rivers of the North-eastern Border-land

The rivers of the north-eastern division of the Indian Empire, Burma, run like the hills from north to south. The province itself is divided by the Irawadi into two nearly equal strips.

That great river crosses Burma from north to south, and is one of the most important natural features of the Provinces. It is navigable at one season of the year or another throughout almost its entire length, and is the great highway of Burmese commerce.

It is joined by the **Chindwin** and a number of smaller streams on the right or west bank, and by the **Taping**, **Shweli**, and **Madaya** on the left.

A great part of the low-lying country near the banks of the Irawadi is watered by that river, which during the south-west monsoon overflows its banks, leaving vast stretches of country covered with a soil suitable for rice cultivation. The Irawadi valley is cut off from the narrow coast region on the west by the westernmost chain of the Malay festoon, known in Burma as the **Arakan Yoma**, and on the east by another branch of the festoon of new-folded mountains, the **Pegu Yoma**.

Of the rivers that drain the coastal region the chief is the **Kaladan**.

The **Salwin** next to the Irawadi is the most important Burmese river. It rises in the unexplored country in the east of Tibet, and its source has not yet been accurately determined. The last 600 or 700 miles of its course is through Indian territory except for a small stretch where it forms the boundary with Siam.

Midway between the Salwin and the Irawadi, and flowing like these streams southward, is the **Sittang**. The Sittang drains the valley between the Pegu Yoma and the Shan Hills.

In almost every part of the Burmese valleys, the rivers overflow their

banks in the wet season, and leave in the low-lying depressions shallow meres which shrivel as the dry seasons advance. These **Jhils**, as they are called, are common in all parts of Burma.

### Rivers of the North-western Border-land

The north-western borders of India, which may be taken to include, besides part of the North-west Frontier Province, the whole of Baluchistan and Afghanistan, is a desert, or semi-desert tableland region, which all through historical times seems to have been growing drier and drier.

Throughout a large part of this region, indeed through nearly all of it save the Hindu Kush and Safed Koh, the average annual rainfall is less than 10 inches.

The greater part of the region is therefore one of continental or inland drainage, that is, the rivers dry up or fall into inland salt lakes or marshes called in this part Hamuns. Some of the streams that rise on the north-western frontier reach the Indus as has been shown, and the valleys through which these rivers flow are often the only ways of passing over the successive ridges which on the east rise upwards to the Central Plateau; but most even of those streams that rise in the eastern hills get lost in the sandy deserts. A large part of the centre and north-west of Baluchistan drains into a marsh called the Hamun-i-Mashkel, while the Lora Hamun receives the drainage of most of the north-east. The centre from which the streams in the southern part of this area radiate is near Quetta.

The Hindu Kush, with their continuations the Koh-i-Baba and Koh-i-Safed, cross Afghanistan from east to west; and these mountains send out spurs to the north and to the south, dividing the country into numerous valleys drained by south-flowing and north-flowing streams that never reach the sea. The only Afghan waters that communicate with the sea are the streams that, rising in the north-western mountains, flow into the Indus.

The **Oxus** on the north-east, which forms the boundary between Badakhshan and Afghan Turkestan on the south and Bokhara on the north, is a Russian rather than an Afghan river. Indeed, it receives few tributaries on its left or Afghan bank, many of those which flow north to join it ending in the sands of the desert. The Oxus flows into the Sea of Aral.

Of the rivers that rise among the northern spurs of the Koh-i-Baba and Safed Koh the principal are the **Murghab**, the river of Merv, and the **Hari Rud**, the river of Herat.

Nearly the whole of Afghanistan south of the Koh-i-Baba and Koh-i-Safed is watered by the **Helmand**.

The Helmand rises in the Koh-i-Baba in Kohistan and flows

generally in a south-west direction; west of Kandahar it is joined by the **Arghandab**, the river of Kandahar, which brings with it the drainage of the valleys south-east of Kabul. Then it flows first south, then west, then north-west, and ends in the Hamun-i-Helmand on the borders of Persia. From the southern end of this marsh the **Shelag** carries the overflow water south-east into the **Goed-i-zirreh** swamp. South of Kandahar between the Helmand and Quetta is a desert of shifting sand, the **Helmand desert**.

## ROCKS OF INDIA AND CEYLON

To understand the arrangement of the rocks in the Indian Empire it is necessary to learn something of the past history of this portion of the earth's surface, and incidentally something also of this history of the earth itself.

### Nebular Hypothesis (earlier form)

To explain the origin of the solar system and of the earth the French mathematician La Place put forward more than a hundred years ago his **nebular hypothesis**. According to his theory, bodies like the earth, condensing from gaseous condition, have passed through a liquid or molten state. Because these bodies cooled most rapidly on the surface a solid crust was formed; and, as the cooling and the contraction which accompanied it proceeded, the crust in order to accommodate itself to the shrinking centre threw itself into folds or wrinkles.

To this wrinkling of the crust was traced the elevation of one part of the earth's surface and the depression or sinking of another part. By this hypothesis the continuous movements of the solid outside part of the earth, the crust, and the arrangement of the crust in a succession of layers or coats, were supposed to be accounted for. More recently, to meet the objections of physicists and mathematicians, who found that tides, among other things, could only be accounted for on the supposition that the earth was more unyielding throughout than steel, various other explanations have been given.

### Meteoric Theories

According to these explanations some nebulae exist not as diffused incandescent gas but as swarms of meteors, that is, of solid bodies of varying sizes revolving round a centre. From such a nebula our solar system was derived. The earth, Professor E. H. L. Schwartz maintains, began as a collection of cold meteorites. During the crowding together of the meteors that made it up, there was a period when the surface of the earth was warmer than it is now, the heat being caused partly by the contraction under gravitation of the mass of meteors and partly by the violent collision of meteors with the central

core. As the surface cooled, and the supply of heat from the contraction under the influence of gravitation was kept up, the earth separated into three parts: a central metallic heavy part, the **barysphere**, and an outside crust made up of two layers—a deep layer made up of **acid rocks**, like **granite**, and an upper layer made up of **basic rocks**, like **basalt**.

This theory of the origin of the solar system in a spiral nebula of meteors or planetismals is sometimes spoken of as the **planetismal hypothesis**. More recently another form of the planetismal theory has been put forward according to which the solar system was due to the passage of a second sun near to our sun. The effect of this passage was to tear away great masses of matter from the sun, and these masses, instead of falling back into the sun, continued to move round it, under the force of gravity and the impulse given by the second sun.

### Conclusions

What an examination of the earth's crust makes certain is the fact of its perpetual change, that is, the rising of one portion and the falling of another: There is every reason to believe that any part of the earth's surface will sink if material be added to it, or rise if material be removed, and that the sinking of one part will cause the elevation of another. The whole surface of the earth under the strains to which it is being subjected is constantly thrown into folds, one part rising and another sinking, volcanic activity manifesting itself in proximity to the **fracture lines**. The rising and falling depend on the weight of the earth's crust in any locality; if the weight be increased the ground in that locality will sink, if it be decreased it will rise.

•

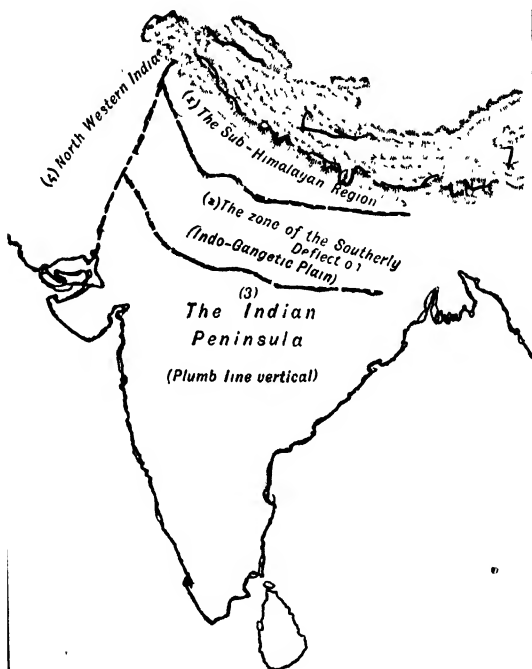
### Proofs from India

India supplies an excellent proof of the height of land being a question of the weight of the part of the earth's crust in the locality. The diversion of the plumb-line from the true vertical in different parts of India shows that India may be divided into two regions: a peninsular or southern region where the plumb-line takes the true vertical position; a wide belt north of the peninsula where the plumb-line is drawn to the south. This is entirely contrary to what would be expected, as the enormous mass of the Himalayas and of the southern Asiatic plateau lies to the north, while to the south there is only the low tableland of the Deccan. It can only arise from the fact that the weight of the Deccan plateau and the material below it is greater than the weight of the Tibeto-Himalayan region and the material below it.

## INDIA AND CEYLON

## Effects of Varying Weights at Different Parts of Surface

This inequality of weight at different parts of the earth's surface is a force that must always be in operation. The



Map (after Col. Burrard), showing the approximate static equilibrium of the crust

moving air, and moving water in its liquid or solid form, the diurnal and annual changes of temperature, and the perpetual grinding of one part of the earth's crust against another are causing constant changes in the surface. The winds and the streams and glaciers are constantly removing matter from one

part and transferring it to another, so that the earth's surface is being constantly destroyed and constantly regenerated.

### Kinds of Rocks

The original rocks of the earth's crust were either **basic**, like **trap** solidified near the surface, or **acid**, like **granite** solidified at greater depths; and from the repeated destruction and recombinations of these acid and basic rocks all the rocks that form the earth's crust have been made. These have been deposited in layers one above the other. An examination of the different layers of rock that form the earth's crust has led some geologists to group them into rocks of three kinds, to which the names **Primary**, **Secondary**, and **Tertiary** have been given.

These names have been given with reference mainly to the structure of the rock layers. Besides the crystalline rocks, not as a rule laid down in layers, the **primary rocks** are taken to mean all the lower layers of stratified rock up to the Permian, that is in India up to the Gondwana beds, which include the chief coal measures. These primary rocks take in what your map shows as very old and as old rock. When these primary rocks were broken up and their constituents recombined and redeposited, **secondary** rocks were formed.

The destruction, redistribution, and redeposition of the materials of the secondary rocks gave rise to **tertiary** rocks. A **quaternary** group of rocks consisting of the most recent deposits is usually added; the quaternary being divided like the other groups into various sub-groups.

Another classification of the rocks forming the earth's crust arranges them in four geological eras, determined by the presence or absence of the remains of living forms, and where remains of living forms are found, by their character. Lowest of all is the **Eozoic** or **Archæozoic**, above that the **Palæozoic**, then the **Mesozoic**, and last of all the **Kainozoic**.

Rocks, it is found, are either stratified or unstratified. By stratified rocks is meant rocks that have been laid down in layers one above the other. These stratified rocks form the greater part of the outside crust of the earth, and the era or period of time in which they were laid down is fixed by geologists by reference to the degrees of development of the living creatures that occupied the world at the time they were being laid down. This is judged of from the remains of such animals or plants as are found in the different strata. Geologists assume that strata containing traces of life-forms of a similar stage of

development were laid down at, or nearly at, the same time; and with this key they have read the story written in the rocks themselves and evolved a history of the earth, and of the various stages by which it has reached its present state.

### Central India and the Deccan

More than half the area of peninsular India consists of very old crystalline rocks, **gneisses**, **schists**, and **granites**. These must have been formed at great depths and been brought to the surface by the denudation of the overlying rocks.

These very old rocks deserve special attention on account of the valuable minerals found among them. Very rich iron ores occur in the Central Provinces, and in *Bellary* in Madras; copper is found in the *Singbhum* district in Chota Nagpur and in Bihar and Orissa; and gold chiefly in the quartz reefs of *Kolar* in Mysore.

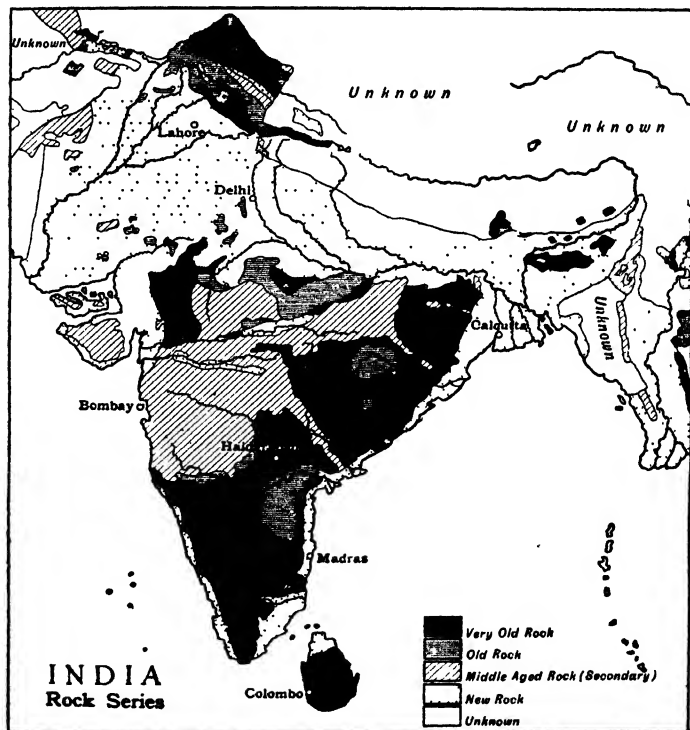
Throughout the greater part of the peninsula, over these much-folded gneisses and schists enormous thicknesses of sediments were laid down in successive layers. These have since been mostly removed by denudation or overlaid by lava outflow, as in the north-west of the peninsula. Patches of these sediments still occur, however, in Bombay, Madras, the Central Provinces, and Burma.

Like the highly-folded rocks beneath, the different strata composing this second group are entirely without fossils. They consist for the most part of lower beds of highly-metamorphosed clays, and of upper beds consisting of shales, limestones, and sandstones more like later sedimentary rocks.

The **Vindhyan system**, a part of this group which takes its name from the hills that form the northern scarp of peninsular India, is remarkable for including the rocks among which diamonds are found. Among the old conglomerates of the Vindhyan system in the State of Panna, diamond-mining is still an industry.

The most important products of this upper system of very old rocks are the sandstone and limestone building-stones. In upper Burma rubies are a valuable product of the same system, both at **Nanyaseik** in the **Myitkyina** district, and in the **Sagyin Hills** in the **Mogok** district north of Mandalay. Rocks of the same system are also to be met with south of the crystalline or granite axis, that is, the **Zaskar** or main line of the Himalayas, at such hill-stations as Simla and Naini Tal.

In the **Salt range**, which lies to the north-west of India and runs between the Jhelum and the Indus, very old rocks undoubtedly are found overlying a much younger formation of red marl, rock-salt, and gypsum. The salt deposits in these hills are among the most extensive in the world. The older rock systems of Europe are but imperfectly



represented in the Indian Empire. Shales and limestones containing remains of living forms that prove them contemporary with the carboniferous system of Europe occur in the Lipak valley of the Eastern Spiti, otherwise the carboniferous strata do not seem to be represented in India.

What is known as the Gondwana system consists of patches



of fresh water, and sometimes of marine rocks interstratified and corresponding in age to the rocks in Europe known as Permian, Triassic, and Jurassic, that is, belonging to the Upper Palæozoic and to the Lower and Middle Mesozoic eras.

These rocks occur in patches over a considerable part of peninsular India, and are met with also in Afghanistan and Baluchistan, in the north-western Himalayas, and in Assam and Burma to the north-east.

In the Peninsula after the lapse of untold ages the Gondwana rocks seem to have been deposited on the Archæozoic Vindhyan rocks, in the hollows of which, caused by subsequent faulting, patches of them are still preserved.

At the time when they were deposited, India, Australia, South America, and South Africa, if not forming parts of a single land mass, seem to have been sufficiently closely connected to permit of the free mixing of land animals and plants. The system takes its name from Gondwana Land, a portion of Central India south of the Narbada. At the time when the Gondwana beds were deposited the east coast of the peninsula seems to have existed pretty much as at present, but what is now the Indo-Gangetic plain seems to have been a portion of the vast central sea which, covering the plateau of Iran and stretching north to the Arctic Ocean, separated what is now the eastern part of Asia from what is now western Europe. That the peninsula was then connected by land with South Africa seems more probable when it is remembered that a ridge so definite runs from the Deccan to Africa, that the water in the part of the ocean north of the ridge has an average annual temperature three degrees higher than the water to the south of it.

To the inland sea which in Gondwana times is supposed to have bordered the Deccan on the east and north, the name **Tethys** has sometimes been given.

A boulder bed of glacial origin forms in most parts the basis of the Gondwana system, its ice-scratched boulders calling in question the beliefs of those who hold that the earth is steadily growing colder. Few fossils have been found in these boulder beds, and these only in the upper layers.

Above these ice-marked boulders in the Gondwana system is the **Damuda** series, a series which is of the greatest economical importance, as it yields more valuable minerals than any other series known in India. It is in this series that the most valuable Indian coal seams occur; and in the middle of the series a valuable iron-ore is found.

The series is remarkable for the abundance of its ferns with simple undivided fronds, and of plant-forms with veins that make a network.

The ferns and other plant-forms found in the Damuda series show that the rocks belong rather to the Mesozoic than the Palæozoic era, and are closely related to similar strata in Australia, South Africa, and South America.

Ninety-five per cent of the coal produced in India is got from the Gondwana system, the remaining 5 per cent being obtained from the Kainozoic strata in Burma, Assam, Baluchistan, and the Punjab.

It has been calculated that the coalfields of India cover an area of between 30,000 and 40,000 square miles, though the amount of coal produced at present does not exceed 15,000,000 tons annually, and so is little more than one-twentieth of the quantity produced in Great Britain. The most important coalfields in India, judging from the quantity at present produced, are those of **Rāniganj**, **Jheriā** and **Gīridih** in Bengal, of **Singareni** in Hyderabad, of **Umaria** in Central India, and of **Warorā** in the Chanda district of the Central Provinces.

All over the world the end of the Mesozoic era and the beginning of the Kainozoic was marked by volcanic disturbances on a vast scale.

The best-known example of the volcanic activity of the period is the Deccan trap, which was poured forth till it covered, to a depth of from 4000 to 6000 feet, the older rocks of the peninsula over an area of more than 200,000 square miles. The layers of ashes and of lava, and the inter-stratified marl beds in which fossils are often found, keep everywhere their remarkable flatness, and the separate lava-flows seldom exceed 15 feet in thickness. From the fossils found in the limestones and sandstones underlying the trap, and from those found in the rocks overlying it, geologists have concluded that the Deccan trap belongs to the same age as the basalts of north-western Europe.

A somewhat later flow of volcanic matter took place in Upper Burma, where **serpentine rocks** are found piercing **miocene strata** and yield the valuable mineral **jadeite**. Similar intrusive masses are found in the Arakan Hills and in the Andaman Islands, thus showing that these are a portion of the dependent **Malayan loop** which connects the Alpine-Himalayan mountain system with the Pacific volcanic girdle.

### • North-western Border Region

On the north-west a similar dependent loop shows that Baluchistan, in the later Mesozoic and in the Eocene and Miocene periods of the Kainozoic era, was the scene of a tremendous manifestation of volcanic activity. During this period there were also great folding movements, from which the strata suffered much deformation. Dikes and sills of dolerite were injected before the **pliocene strata** were deposited, and ashes and lava were injected into the **pliocene rocks** of the **Siwalik Hills**, while volcanic activity has continued both in Persia and in Baluchistan to the present day.

**Laterite** or iron clay is the name given to the material of the rust-coloured caps that are often found on the top of rocks in moist tropical climates. It probably consists of altered volcanic detritus, and is found almost in every part of the trap region. One of the most interesting of recent Indian deposits is the **Porbandar stone** which is quarried along

the coast of the **Kathiawar** peninsula, and is much used for building in the Bombay Presidency. The stone, a calcareous sandstone or a sandy limestone, is made up largely of the shells of foraminifera mixed with small quantities of sand.

### Mountain Region and North-west Border Region

In Sind, Baluchistan, and along the foot of the Himalayas tertiary rocks occur, and in the lower tertiaries of the Kohat region in the north-west, valuable deposits of rock-salt are mined.

The salt in this region is associated with gypsum shales and sands, and is very different from the salt found in the red marls under the Cambrian rocks in the Salt range.

### North-eastern Border Region

The tertiary rocks of Assam are important on account of their limestones, their coal beds, and their mineral oils.

In Burma the tertiary rocks are of enormous thickness, and the folding of the pliocene rocks determined the arrangement and direction of the great valleys of the Irawadi, Sittang, and Salwin.

The **Pegu system** or miocene rocks are important. In the Prome series, the lower of the two series of which the Pegu system consists, occur the oil-bearing sands from which Burma derives her supply of petroleum.

In Burma the Yenangyaung field includes several porous sands at a depth of 200 feet, covered by clay beds which help to retain the oil. In Baluchistan oil springs are common, but they are not connected with reservoirs which can be tapped. In the Punjab similar tertiary oil springs are known to exist in the neighbourhood of Rawalpindi and to the south-west of it; though the production of oil is small. Assam, which is next to Burma the presently most productive of the oilfields, yields between 3,000,000 and 4,000,000 gallons, while Burma produces between 200,000,000 and 300,000,000 gallons.

### Indo-Gangetic Plain

Between the Deccan and the Himalayas is the great continental plain to which the name India was first given, the plain of the Indus and the Ganges. This is the most important and the most extensive of the alluvial deposits of India. It consists throughout of a sandy or chalky clay, the older alluviums being distinguished by the separation from the general material of the carbonate of lime in the form of nodules called **kankar**.

This kankar is largely used as road metal and as a source of lime. In the Indus valley the deposits are much more sandy than they are in

the Ganges valley. They are more sandy also in the valley of the Brahmaputra. Nearly the whole of both the Indus and the Brahmaputra valleys is occupied by newer deposits, while, save towards the delta, the greater portion of the Ganges plain is made up of an old alluvium.

The plain stretches across India for nearly 1700 miles, and nowhere rises to a height of 1000 feet.

It varies in width from 90 to 300 miles, and occupies an area equal nearly to twice the area of France. The thickness of the alluvial deposit is not easily estimated. A boring at Calcutta was put down for between 400 and 500 feet without touching rocky bottom or reaching a marine bed. At Lucknow the boring was continued to a depth of over 1000 feet, and the only sign of approaching a sea bed was the appearance of coarse sand near the bottom of the hole.

Westward in Rajputana a considerable portion of the country is occupied by the Thar or Indian Desert.

This is the most important stretch of blown sand in the Empire. The vast quantities of sand in the desert have been transported there by the south-west wind in the hot season. The Thar stretches from the Rann of Cutch along the side of the Indus valley, and has its sandhills arranged in ridges. The centre of the Thar was probably dry land made from the material removed from the Aravalli Hills; while the rest of it, together with the Indus and Ganges valley, was occupied by the sea.

### Coastal Plains

Along the east coast of India, from the mouth of the Ganges to Cape Comorin, there is a broad alluvial strip formed chiefly of the materials brought down by the rivers of the peninsula. This consists almost entirely of gravels and sands and clays, the latter often mixed with kankar.

There is no alluvial plain on the west side of the peninsula, but recent alluvium connects the hills of Bombay and Salsette Island. Farther north the alluvial plain of Gujerat, 30 miles broad near Surat and 60 miles broad near Baroda, is very like the alluvial strip along the east coast.

### CLIMATE OF INDIA AND CEYLON

Almost every kind of climate that can be met with in the Tropics or in the warm temperate zone, in the cold temperate zone, or even in the polar regions, is met with in India.

The average annual rainfall varies from less than 3 inches in Sind to nearly 500 inches in Assam. During one portion of the year there are parts of India which are deluged with rain, and during another period the same parts are scorched. In India more than anywhere else those contrasts of climatic conditions known as the **monsoons** are clearly manifested over a large area. It must be remembered, however, that it is wrong to assume that the weather conditions in India can be studied entirely by themselves, that is, that India forms an isolated climatic region. The enormous mountain barrier to the north, and the elevated land masses on the north-west and north-east, have undoubtedly a very pronounced effect on the climate of India, and in particular on the climate of the Indo-Gangetic plain, but only to the extent of modifying the climate. Judging from the conditions in North America, we are safe in saying that the temperature of the Indo-Gangetic plain is 4 or 5 degrees above what it would have been if, instead of being protected on the north by mountains and tableland, there had been to the north of it a plain sloping gently towards the Arctic Ocean.

The enormous mass of lofty tablelands in Central Asia have an important effect too on the air circulation of the continent. In the winter this land surface becomes exceedingly cold, and the high-pressure belt, usually in the neighbourhood of the Tropics, or rather in the Northern Hemisphere in the neighbourhood of 30° N., is as far north as latitude 45° N.; and the winds over the space between the high-pressure belt and the low-pressure doldrums, which towards the close of the winter run from 5 to 10 degrees south of the Equator, blow from the north and the north-east. This is the cold-weather season over India. The temperature at this season in the Indo-Gangetic plain is from 60° to 70° F., but of course it increases rapidly as we go from the north to the south.

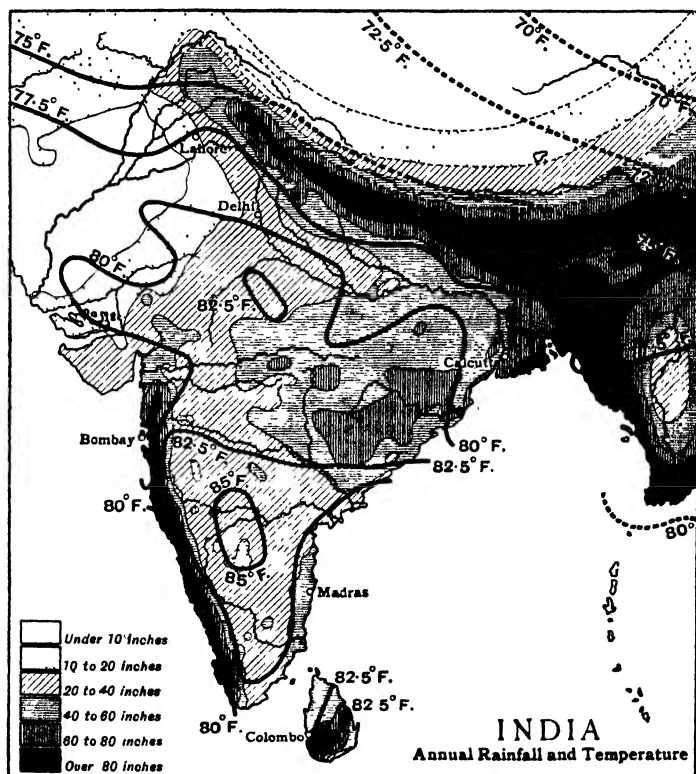
### Monsoons

India is a monsoon country, that is, it is a country in which the winds blow in one direction during one part of the year, and in another direction during another part. In the northern summer the great mass of land in the Northern Hemisphere gets very much heated. The line of greatest heat is drawn to the north, and the south-east trades blow a great way north of the Equator. A wind blowing from the Equator to the north pole seems, in accordance with Ferrel's law, to blow from the south-west. The **South-west Monsoon** reaches the coast of India about the end of May, and it continues to blow from May to October.

India, it must be remembered, is the central of the three great peninsulas which stretch southward from the immense mass of continental Asia, and its climate is very much influenced by the fact

that it has the Indian Ocean to the west of it and the Bay of Bengal to the east.

The southern or peninsular part of India, though in the Tropics, has never either the extremes of cold or of heat of the northern or continental part.



In Baluchistan and in some parts of the north-west, rises and falls of the thermometer of over  $60^{\circ}$  have been recorded in the twenty-four hours.

The south-west wind, which blows over the warm waters of the southern Indian Ocean and across the warm equatorial and counter-equatorial surface currents, reaches the coast of India as a warm wind saturated with vapour. It strikes the Ghats, the western hills

of the Deccan, and in rising over their 3000 to 4000 feet of height is cooled, and has to yield up a considerable part of its moisture.

Gradually the south-west monsoon is extended over the whole, or almost the whole, of India, and it continues to below from June to September inclusive. This is the wet season in India, the most important season of the year. On the amount of rain that falls at this season, and on its distribution, the welfare and prosperity of seven-eighths of the people of India depend.

The south-west monsoon may be regarded as consisting of two important air currents, the Arabian Sea current and the Bengal current.

Cyclonic storms, sometimes of extraordinary violence, mark the advance of these two currents. Frequently these storms actually precede the establishment of the monsoon current in these regions. Only a small part of Arabia, the south-west, shares in the Arabian Sea monsoon current, which is mostly turned towards the Bombay coasts of India, and brings rain to the peninsula. After crossing the Ghats the Arabian current blows over the peninsula as a west or, in some cases, even as a north-west wind. Another portion of the monsoon air current is deflected to the Bay of Bengal, and part of this current gives rain to Assam, Bengal, and the Ganges plain.

Another portion of the Bengal current gives rain to Burma, Assam, and Southern China. The volume of the Arabian Sea part of the monsoon current is probably at least three times that of the Bengal part.

The northern part of the Arabian Sea monsoon current, striking on the low and extremely hot coasts of Sind, Cutch, and Kathiawar, is further heated, and passes over the western part of Rajputana, yielding little rain till it reaches the Aravalli Hills. Another part of it, advancing still farther Himalaya-wards, mixes with part of the Bengal current and is partly pushed westward, supplying with moderate rains the eastern Punjab and the western Himalayas.

There can be no doubt that the south-west monsoon of India is simply, as has been said, the south-east trade wind drawn across the Equator by the advance northwards of the equatorial low-pressure area. It is hoped, therefore, that a careful study of the weather conditions south of the Equator will, by and by, enable the character of the monsoon to be foreseen, and the necessary steps taken to avoid those periodic famines which have hitherto accompanied the partial failure of the monsoon rain in parts of India.

The most important variations of these monsoon rains are that they occasionally start later than usual, sometimes as much as three weeks later; that at irregular intervals a break or interruption of them occurs; that sometimes they end more early than usual; and, finally, that the rain is frequently more largely directed to one part of the region than to another.

As the sun goes southward matters are reversed. The north-east trade wind blows in the normal way over the Bay of Bengal.





Only, instead of calling it the north-east trade, it is called the north-east monsoon.

The north-east monsoon prevails from December to May, and brings moisture to the eastern coasts of southern India; so the Madras Presidency and the parts just north of it have two monsoons, of which the second and shorter ends usually in November. The north-east monsoon is fully established by the beginning of January. It is marked by clear skies, low rainfall, and a large daily range of temperature. The changes of the monsoon are often preceded both in the Arabian Sea and in the Bay of Bengal by cyclonic storms, sometimes of great violence.

### Indian Seasons

There are three seasons in India, the **hot**, the **wet**, and the **cold**. The hot season lasts from March to June, the wet from June to December, and the cold season from December to March.

The parts of India with the highest average annual temperature are towards the south. Part of the Madras Presidency has an annual average temperature of over 85° F. But though the annual average temperature of the Deccan is so high, the heat is never so great as it is in continental India.

As the Western Ghats are the hills against which the south-west monsoon first strikes, the rainfall all along the west coast is very heavy, the average being about 120 inches. Even this is slight compared to the rainfall in Assam and along the eastern Himalayas, where the rainfall often amounts to from 50 to 60 feet in a year.

The heated surface of the low plain to the north-west of India warms the winds from the south-west, which blow therefore across the valley of the Indus and the hot sands of the Indian desert as dry winds, till they reach the Punjab and the foothills of the Himalayas. Though the annual rainfall at Karachi is only 5 inches, it is one of the dampest of places. The central and eastern provinces of the Deccan do not benefit greatly from the south-west monsoon, as they lie largely in the rain shadow of the Ghats.

About the middle of September, when the north-east monsoon sets in, parts of the peninsula only slightly affected by the south-west monsoon have their rainy season.

During this time the low-pressure area, which, at the establishment of the south-west monsoon, ran as far north as the Persian Gulf, Baluchistan, and the United Provinces, is gradually transferred southwards.

The rapid cooling of the soil of western Asia, too, and of the air above it, establishes an area of high-pressure to the north-west of

India which causes the air movements in continental India to be chiefly towards the east.

From October to December the air movement in continental and Central India is largely from the west down the plain of the Ganges. During this time the air movements in continental and peninsular India are from opposite directions. In Northern India the movements are from the west, and in Southern India from the east.

During the months of October, November, and December the rainfall of the retreating south-west monsoon is much smaller in amount than during the previous three months. Except on the Madras coasts and in north-eastern India and Burma, there is practically no rain during this period.

The average rainfall over all India is 45 inches, and it is said that 90 per cent of this is due to the south-west monsoon, which brings rain to every part of India, though very unequally.

### Climate of Indo-Gangetic Plain

In the Indo-Gangetic plain violent storms usually accompany the changes of the seasons. The rainfall increases as we go from west to east, and from April to end of May the temperature is high. The western portion of the Indo-Gangetic plain is one of the driest regions in India and its climate is the most continental. The rainfall in many parts of it is less than 5 inches, and there is a daily range of temperature of over  $30^{\circ}$  and an annual range of over  $70^{\circ}$ .

The hot weather, especially in Northern India, is almost unendurable by Europeans. The heavy rains that the monsoon brings cool both the air and the ground, and make life bearable; but in the latter part of the rainy season, when the ground and air are alike soaked with moisture, malaria becomes prevalent. No part of India can be said to be perfectly suitable for Europeans. In Northern India the unhealthy season follows immediately after the rains. From December to June the climate is comparatively healthy.

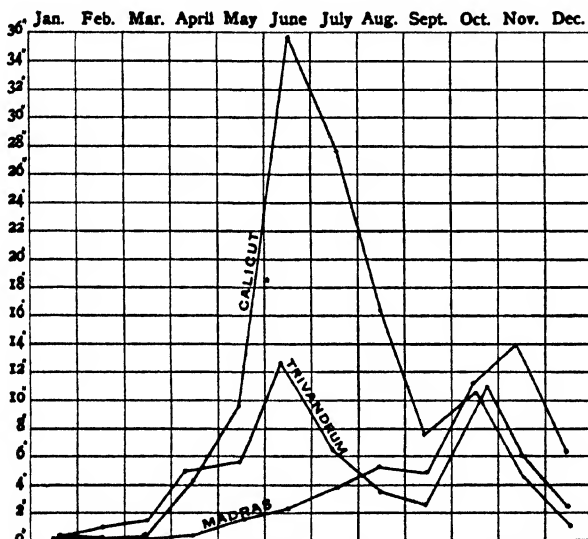
### CLIMATE OF SOUTHERN INDIA

In tropical India, that is, in the Deccan, the healthy period is much shorter. Only among the hills over 7000 feet high does the fever germ become comparatively harmless. Some parts of India, like the Punjab and Madras, have two distinct rainy seasons, and there the land yields two and in some cases three harvests a year.

The north-east monsoon is fully established over the whole Indian area by the middle of December, and lasts from that time

till towards the end of May; but it is during the earlier October and November, the period of the retreat of the south-west monsoon, that the north-east monsoon brings most of its rain supply to Madras and Ceylon and Southern India.

The hot-weather period, which lasts in India from March to June, is one of constantly increasing temperature both in peninsular and



Rainfall, Southern India. April to June, south-west monsoon; September to November, north-east monsoon—two Rainy Seasons

continental India, where the heat during the day is greatest. The greatest temperature yet recorded in India was 126° F. at Jacobabad in Upper Sind.

## SOIL AND PRODUCTIONS

Much of the soil of India is exceedingly fertile. This is specially the case with the great river plains of Northern India, the plains of the Ganges and of the Indus, and with the alluvial strips that stretch along the eastern and western coasts of Southern India, widening out near the river mouths and

stretching upwards along the valleys of the great rivers, the Kistna and Godavari.

These alluvial tracts are the widest and by far the most fertile, and therefore the most important, in the peninsula. The deltas of the Godavari and of the Kistna consist of a dark-coloured loam.

### Indo-Gangetic Plain

The soils of the Ganges plain and of the plain of the Indus are for the most part very rich. They vary in colour from brown to a light-fawn, and consist in some places of light sand and in others of stiff clays. The soils in Bengal are lighter in colour and heavier than those in the Indus valley. The amount of organic matter and of mineral salts in the soil is generally sufficient, and the great depth of the soil secures its natural fertility.

With a sufficient rain supply the soils of the Indo-Gangetic plain are able to produce great quantities of millet, rice, and other food-stuffs. Of the total plain an area of 180,000 square miles in round numbers is devoted to the growth of grains and pulses. This amounts to nearly three-fifths of the total land in India on which food grains and pulses are grown. Taking into account the whole of India and Burma, about one-sixth more land is devoted to the cultivation of millets and pulses than to the cultivation of rice.

In Bengal and in Bihar and Orissa, however, rice is by far the most important crop; four-fifths of the land used for the production of food grains being given up to its cultivation.

In the United Provinces, less than a fifth of the land set apart for the growth of food grains is given up to rice cultivation, fully a fourth is devoted to wheat, and fully a half to the growth of millets and pulses. In comparison with Bengal, more than twice the area in the United Provinces is planted with sugar-cane. In the Punjab, while rice is only grown in particularly favourable localities, the wheat production is greater than that of the United Provinces.

In some districts of the United Provinces the poppy is grown for the production of opium, which is sold to the Government for exportation. The Punjab, the United Provinces, and the Central Provinces and Berar are the chief wheat-growing provinces in India. Of the maize grown in India, ten-elevenths is grown in the Indo-Gangetic plain, Bihar and Orissa and the United Provinces being the provinces that produce the greatest quantity. Barley also is grown to a considerable extent in the United Provinces.

### Central India and Deccan

The comparatively recent volcanic rocks, which cover such a large area to the north-west of the Deccan, form on the slopes and uplands a light sandy soil which is productive only in years of favourable rainfall.

The valleys and the lowlands along the banks of the rivers are covered with a soil that is, as a rule, much darker, much deeper, and much more fertile. This soil, which is known as black cotton soil, occurs in the vast region of Deccan trap in the north-west of the peninsula.

It occurs in the lower parts below the general level of the hills, and varies very greatly in depths. In the valley of the west-flowing Nerbada and Tapi, and in some parts of the valleys of the Godavari and Kistna, it is as much as 20 feet deep. During heavy rains the black cotton soil becomes unworkable, and in that case is better suited for early spring wheat than for an autumn crop. For the autumn or Kharif season the principal crops on the black cotton soil is **jawar**, or grey millet, known in Madras as **cholam**. The soil in which it is grown is, as a rule, only about 4 feet deep. Black cotton soil occurs in the river valleys also outside the area of the Deccan trap. In this case the soil has been transported, just as in a general way it is sedentary. Cotton is grown chiefly in Bombay, Madras, the Central Provinces, and Coorg. The cotton chiefly grown in India is a quick-ripening, short-fibred variety, though it is possible that India may yet compete with America in the British market as a producer of long-fibred cotton.

On the black cotton soil the principal grain crops are corn and millet. Where the soil is deep and there is plenty of rain, wheat, linseed, and pulses are also grown.

The soils formed from the older rocks, of which the southern and eastern part of the Deccan is composed, vary greatly in their character and in their productiveness.

Crystalline rocks occupy nearly the whole of the Madras Presidency, except the alluvial strip on the coast and along the river valleys. They occupy also the whole of Mysore, the south-east of Bombay, most of the eastern part of Hyderabad and of the Central Provinces, and a considerable part of the south of Bihar and Orissa.

The soils derived from these rocks vary greatly in fertility. Where they are deep they yield good crops. These soils also vary greatly in colour, ranging from red to brownish-yellow. Rice is the staple crop produced; and everywhere good results are got from irrigation, which in the Deccan is mainly from tanks.

On the uplands, where there is no irrigation, the soil in the crystalline areas is thin and stony, and yields but a poor crop. In the lower levels the loams produced are very fertile.

### Irrigation

Only in Bengal, Assam, and Lower Burma, and on the Malabar coast of Bombay—only, in other words, in those parts where the annual average rainfall exceeds 70 inches—is no form of irrigation needed. Though the wells are usually made by private enterprise, and the amount of land irrigated by each is in most cases very small, well-irrigation is, taken as a whole, of very great importance. Of the total land irrigated in British India it is calculated that about one-third is irrigated from wells. Of this well-irrigated land about three-fourths is in the United Provinces and the Punjab, and one-fifth in the Madras Presidency.

Wells are distinguished as permanent and temporary. The temporary wells are small holes through which their supply from near the surface is drained, and they are allowed after a year or two's use to fall in. The permanent wells are solidly built and lined with masonry, and may last for years. Of the wells in the United Provinces and the Punjab the majority are temporary. In the Deccan, where well-irrigation is used only for the more valuable crops, a single well irrigates on an average from 2 to 3 acres. In the United Provinces and the Punjab, where temporary wells are in a majority, the average amount of land irrigated per well is less.

Various means are used for lifting the water. Among the most common of these are the *picottah* or *dhenkli*, in which the water is raised by a kind of pump; the *mot*, a large leather bag in which the water is drawn up from the well by bullocks; and the *Persian water-wheel*.

Over a large part of the empire much of the land artificially watered is irrigated from storage tanks. These vary in size, from lakes like the Periyar in Travancore to tanks capable only of watering 10 or even less than 10 acres. The amount of land watered from storage tanks in British India, it is calculated, may be taken roughly at about 13,000 square miles. This is exclusive of the area irrigated in the protected states. In most of these, as in British India, the three forms of irrigation—by wells, by tanks, and by canals—are found existing side by side.

The recurring famines in the last decades of the nineteenth century led to the appointment of a Commission, 1901-3, to enquire into irrigation works in India and their bearing on famines. The Commission reported that where irrigation works would pay in the Punjab, Sind, and parts of Madras, the districts were not subject to famines; but it drew up a scheme for the construction of irrigation canals

during the ensuing twenty years that would add six and a half million acres—fully 10,000 square miles—to the irrigated area in British India.

In no other country has artificial irrigation been turned to such useful account as in India. Without it great areas that are now under cultivation would lie waste, or be cultivated only in years of exceptionally heavy rainfall. Parts of the country that cannot be reached in this way are watered by means of tanks or of wells; the question of a sufficient water supply being, in the climate of India, the imperative one.

Of the irrigation canals, including minor as well as major works, there exist in India nearly 50,000 miles, irrigating over 17,000,000 acres of land.

In Bengal, Bihar, and Orissa, between 3000 and 4000 miles of canal are in operation, by means of which an area of nearly 1,000,000 acres is watered. In the United Provinces there are between 9000 and 10,000 miles of canal in operation, watering about two-and-a-quarter million acres of land. In the Punjab there are between 11,000 and 12,000 miles of canal, watering about 7,000,000 acres of land. The most important of these canal schemes in the Punjab are the **Sirhind**, the **Chenab**, and the **Jhelum**.

Most of the canals in the North-west Frontier Provinces are private property, and the total area irrigated amounts to only about 200,000 acres. Sind, which is almost, as has been said, an entirely rainless region, is totally dependent on irrigation. In olden times a river seems to have made its way from the Himalayas through Sind to the Gulf of Cutch, and to have converted into a garden the eastern part of the region. In Sind now there are of major and minor works over 4000 miles in operation, irrigating nearly 2,000,000 acres.

In the Central Provinces, irrigation works are being rapidly proceeded with. Among the reservoirs constructed the most important is the **Ramtek**, in the Nagpur district, which is intended to irrigate some 50,000 acres. The first really important canal work in the Central Provinces was begun in 1910. The **Tandula Canal** is calculated to cost three-quarters of a million and to irrigate about 250,000 acres. The **Mahanadi Canal**, which cost about the same and is intended to irrigate between three and four hundred thousand acres, has just been completed. Another important scheme is the **Wainganga Canal**, which will cost about a quarter of a million and will irrigate about 80,000 acres. These canals will, it is believed, turn a famine-stricken district into one of the granaries of India.

The Presidency of Madras is noted for the variety and extent of its irrigation. Of major and minor works, there are about 13,000 miles in operation in the Presidency, irrigating about

4,000,000 acres. The most important of the major works in Madras are those by which the deltas of the **Godavari**, the **Kistna**, **Penner**, and the **Cauvery** are watered.

Among the works in the Madras Presidency may be mentioned the Periyar Project, a scheme whereby the waters of the Periyar, which flow naturally into the Arabian Sea, are diverted by a dam 156 feet high and a tunnel into the Vaigai, which flows into the Bay of Bengal. It is proposed also to make, at a cost of £5,000,000, a dam across the Kistna. When finished this will be the largest of its kind in the world, being larger than the Assuan dam on the Nile.

In Bombay proper, excluding land which is really a part of the Indo-Gangetic plain, there are no large irrigation works. The largest are the Nira and Mutha canals, which between them irrigate about 50,000 acres. Reservoirs or tanks are the only irrigation works existing in Ajmer-Merwara, but these have been made in almost every available catchment basin.

Though the Government have constructed two small irrigation works in the Quetta-Pishin district, the rainfall is so slight, and everywhere both in Baluchistan and in Afghanistan the water resources have already been so fully utilized, that there is little or no room for new works. In Upper Burma, where alone irrigation is required, there are some six or seven hundred miles of canal, irrigating about 700,000 acres.

## Crops

**Rice**, **wheat**, **millet**, **pulses**, and **sugar-cane** are the chief crops besides the fodder crops; but **barley** and **maize** are also grown. **Tea**, **opium**, **jute**, **tobacco**, **indigo**, and **cotton** are important products in one part or other of the Indian Empire.

The sugar-cane is cultivated in nearly every province of India, but fully one-half of the acreage under sugar-cane is in the United Provinces.

The tea plant is found growing wild in the Naga Hills, to the east of Assam, and more than half the area on which tea is grown in India is in Assam. Besides Assam, the chief tea-growing districts are **Darjeeling** and **Jalpaiguri** in Bengal, **Dehra Dun** in the United Provinces, and the **Nilgiris** in Madras.

The poppy is grown for opium in some of the native States, principally in the States of Central India and in Rajputana. In British India the cultivation of the poppy is confined to Bihar and Orissa and to the districts in the United Provinces lying north of the Ganges. A small quantity also is grown in the Punjab, but it is in the United Provinces chiefly that the poppy is grown. The ripe capsules of the poppy yield an oil which is used in Europe to adulterate olive oil.



The poppy is a **rabi** or **spring crop**, and is grown usually on heavy loams or light clays.

Of **jute**, which is an important article of manufacture and export, two kinds are cultivated, and it is doubtful which of the two yields the better fibre. Only in Bengal and in Bihar and Orissa is the jute crop important, though some jute also is grown in Assam and in Nepal. It is a crop that takes a great deal out of the soil, and can only be grown profitably on soils renewed year after year by inundation silt. The conditions suitable for rice-growing are also suitable for jute-producing.

**Tobacco** is grown in every province of India and in all the native States. It is estimated that there are nearly 2000 square miles of surface in India under tobacco, Bengal, Bihar, Madras, Bombay, the United Provinces, Burma, the Punjab are the provinces in which it is chiefly grown. The tobacco plant was introduced into India by the Portuguese at the beginning of the seventeenth century. The export of tobacco and cigars from India and Burma has of recent years been rapidly increasing.

**Indigo**, a dye got from the plant *Indigofera*, of which there are a great many varieties, was much in demand in Europe until the discovery of an aniline substitute. Since then the cultivation of the plant has declined, though there are still about a thousand square miles devoted to the crop, chiefly in Bihar and Orissa, in the United Provinces, and the Punjab.

**Cotton** is cultivated in many parts of India, to which it is indigenous. Of the two varieties of cotton grown in India, the kind which takes eight months to ripen and the kind which ripens in five months, most attention is paid to the quick-ripening sort, although it is too short in the fibre for the European market. The late-ripening sorts are suitable only for deep moisture-holding soils, or soils that have a prolonged rainy season. The more quick-growing varieties, which produce an inferior kind of lint, are more largely grown because they can be grown in years of short rainfall without much risk.

Half the total area under cotton is in **Bombay** and **Berar**. The other chief cotton-producing provinces are **Madras**, the **Punjab**, and the **Central Provinces**.

**Oilseeds**, linseed and **sesamum** are cultivated in **Bengal**, the **Central Provinces**, **Madras**, and **Bombay**. **Rape-seed** is produced chiefly in the **Punjab**, the **United Provinces**, and **Bengal**; **castor-seed** and **castor-oil** are got from **Bengal** and **Bombay**, and **ground-nuts** from **southern India**. **Coffee** is grown in the **south of the Deccan**.

### Fruits

India produces a great variety of fruits, including, besides apples, pears, peaches, almonds, strawberries, grapes, and many kinds of oranges and limes, the guava, the Indian plum, the pomegranate, banana, pineapple, coco-nut, and cashew nut, and, most important of all, the mango. In many parts of Northern

INDIA AND CEYLON  
Productions.

The map illustrates the geographical distribution of various products across India and Ceylon. Key products labeled include:

- North India:** WHEAT, BARLEY, COAL, IRON, COTTON, SILVER, WHEAT, TIGER, COPPER, WHEAT, COAL, IRON, COTTON, SILVER.
- Central India:** TEA, RUBBER, CINCHONA, TOBACCO, WHEAT, COAL, IRON, COTTON, SILVER.
- South India:** TEA, RUBBER, CINCHONA, TOBACCO, WHEAT, COAL, IRON, COTTON, SILVER.
- Ceylon:** TEA, RUBBER, CINCHONA, TOBACCO, WHEAT, COAL, IRON, COTTON, SILVER.

India the mango forms the principal food of the poorer members of the community for several weeks in the year. Over a large part of the country the mango is raised from seeds. The best kind of mangoes are known as **Malda, Bombay, and Multan.**

The dried flowers of the mowra or mohwa are also used as food. They fall off the tree in the spring. An intoxicating liquor is made from the flowers; the fruit of the tree is eaten; and the seeds yield a valuable oil.

### Botanical Regions

In India, it must be remembered, the features of many different botanical regions meet and are blended together. Here south-eastern Mediterranean and Persian characters are found conjoined with those of north-western Siberia, and those of eastern China with those of Malaysia.

The upper levels of the Himalayas slope to the Tibetan Uplands, over which a temperate Siberian flora ranges; while columbines and hawthorns and other European species are found in the western Himalayas. At the foot of the Himalayas and in the peninsula, plants of the Malaysian kind are met with, and in the more temperate parts of the eastern Himalayas the rich temperate flora of North China flourishes. In Sind and the Punjab, with their low rainfall, the flora is poor in species, but these are in many respects identical in form with the flora of Persia, Southern Arabia, and Egypt.

Everywhere many sorts of vegetables are cultivated, partly for household use and partly for sale in the cities. In the neighbourhood of the large towns English vegetables are very successfully grown by Indian gardeners. These include, besides **turnips, radishes, and horse-radishes,** many kinds of **cabbages, and beans and peas.** **Gourds, cucumbers, and pumpkins** are cultivated, as are **carrots, lettuces, artichokes, and sweet potatoes.** The potato itself is cultivated in the hill parts and in some cases on the plain; **tomatoes, yams, and onions** are also grown.

### Indian Forests

The forests of India supply a great variety of valuable woods, including ironwood, teak, sandalwood, rosewood, and ebony. The value of these may be judged from the fact that the **exports of teak alone are worth nearly a million pounds sterling.** **The revenue derived from the State forests amounts to about**

£2,000,000, and the net income, that is, the surplus of revenue over expenditure, to nearly £1,000,000.

But the forests have a value to the State far beyond the revenue they yield. They every year supply grazing for countless herds of cattle. From them the villagers draw the supply of building material for their houses and of fuel for their fires. Geographically the part they play in retaining and in distributing slowly the tropical rainfall is of even greater importance. They form really the most important part in India of Nature's irrigation scheme, and yield the country a regular water supply in place of the destructive floods that would occur without them.

Government forest areas cover, including **Burma**, between 250,000 and 300,000 square miles of surface. Of this area fully half is in **Burma**. The **Central Provinces**, **Assam**, **Madras**, and **Bombay** have each a forest area of about 20,000 square miles.

Of native States **Hyderabad** has a forest area of about 5000 square miles; **Mysore**, **Kashmir**, and **Travancore** each of about 2000 square miles, while the forests of **Jodhpur** and other native States are smaller in extent. These, it is calculated, represent a forest area of not less than 42,000 square miles. Besides these the forests owned by private individuals in the British provinces are reckoned to exceed 70,000 square miles.

The forests of India have been divided into three classes, the **evergreen**, the **deciduous**, and the **dry**. These occupy the three climatic belts into which the country has been divided, the wet, the moist, and the dry. The most important of the groups is the deciduous forests. These stretch from the foot of the **Himalayas** throughout the peninsula, wherever the soil and rainfall are suitable, and extend also eastward into **Burma**. They supply the valuable timbers, **Sāl**, ironwood, teak, red sanders, rosewood (a kind of sandalwood), and ebony. They supply also the trees yielding the wood oils, resins, and varnishes so largely used in India.

There are in India and **Burma** more than 100,000 acres that have been artificially planted with trees: teak for its timber, catechu for the cutch it yields as well as for its timber, and other trees, including **rubber trees** and deodar. Teak is a native of the Indian peninsula, **Burma**, and **Siam**; it thrives best in a dry tropical climate, where there are abundant summer rains and a nearly rainless winter. It thrives

best, too, where there is an annual rainfall of more than 56 inches, and where there is an average temperature of more than 75° F. and less than 85° F.

Teak is in great demand in India, which consumes the yield of the forests of Travancore, Coorg, Mysore, Cochin, Madras, Bombay, and the Central Provinces, and even imports a considerable amount from Burma. Burma is the chief teak-producing province, indeed the chief timber-producing province. The Burmese forests yield nearly half the timber produced. The Sāl, or *Shorea robusta*, is another valuable timber tree; it yields, besides timber, the resin dammar. Great forests of Sāl lie along the foot of the Himalayas, and the tree forms a larger percentage of the forest stock of India than the teak.

The coco-nut palm, a lofty and beautiful tree, so widely scattered about tropical lands that it is impossible to say where it originated, is the most useful of the palm tribe to the natives of the countries where it grows. It flourishes on the Malabar and Coromandel coasts of India, and is of even greater importance in Ceylon, where a man's wealth is estimated by the number of coco-nut trees he owns, and where the number of trees under cultivation is estimated at between twenty and thirty millions.

The wet forests on the west coast of India, in Burma, and in the Andamans are next to the moist in importance. In these the average rainfall is over 70 inches, and there is a preponderance of evergreen plants. It must be remembered, however, that while evergreens are in great numbers, deciduous trees like teak and ironwood are to be found in these as well as in the moist tracts. The wild mango, the toon, a valuable timber tree from the flower of which a yellow dye is got, and similar trees are characteristic of the wet forest regions.

The produce of the **dry forests** of the Punjab and of Central India is not of great value, as the trees are usually stunted.

**Tidal forests**, such as those of Sundarbans of Bengal, and of the coasts of Madras and Burma, yield great store of valuable fuel and excellent timber. **Borneo Cutch**, a valuable tanning agent, is got from the bark of several kinds of mangoes that grow in these tidal forest tracts.

### Cattle

In India cows are kept mainly to produce work cattle, and the milk used in the country is chiefly got from buffaloes. Ploughing and other agricultural operations, including the irrigation of the land from wells and the carriage of goods from one part of the country to another, depends chiefly on the work of bullocks.

There are a great number of different breeds of cattle in India. The finest are bred in **North Gujarat**. In many parts the want of an adequate supply of fodder, and carelessness in selecting the cattle to breed from, have led to the production of stock of a very poor kind. Many of the cattle are old and decrepit, but are kept alive because the cow is sacred among the Hindus.

Outside of Bengal, for which no complete or reliable figures are available, there are in British India about 40,000,000 bulls and bullocks and 30,000,000 cows, nearly 20,000,000 buffaloes, and close on 40,000,000 calves. In the native States there are of these four classes probably from 12,000,000 to 15,000,000.

In the deltas of the rivers, where rice is the principal grain grown, the cattle are as a rule miserably weak. In these districts there is little available grazing land, and the rice straw, the fodder mostly in use, yields little nourishment.

In the peninsula the grazing areas have usually a very poor thin soil, and produce chiefly spear grass. In the Ghats, and in some other hill tracks where the rains are heavy, the grass is of very poor quality; indeed, in the peninsula, good grass is rarely found where the rainfall is more than 40 inches annually.

In many of the provinces the problem of adequate grazing for the cattle is a pressing one, and as far as can be arranged without injury to the forests these are being utilized as grazing grounds.

About 4,000,000 cattle and over 500,000 sheep and goats are grazed in the forests of the Central Provinces and Berar; between 2,000,000 and 3,000,000 cattle and 250,000 sheep and goats are grazed in the forests of Bombay; nearly 2,000,000 cattle and 2,000,000 sheep and goats in those of Madras, and over 1,000,000 cattle and nearly 2,000,000 sheep and goats are grazed in the Government forests of the Punjab.

Though the cattle of India generally are of a mixed type and an inferior class, good cattle are bred in certain localities, especially of peninsular India. These are usually upland tracts with a rainfall of between 30 and 40 inches, and yield a fairly plentiful pasturage at all seasons. Such are the breeding grounds of the **Nellore** cattle in Madras, of the **Gir** cattle in Kathiawar, of the **Khillari** and **Malwi** cattle in Central India, and of the **Hariana** or **Hansi** cattle in Sind and the Punjab.

The finest cattle in India, as has been said, are those bred in Northern **Gujarat** in the grassy tracts round the Runn of Cutch stretching northwards to Rajputana.

Of Indian cattle breeds may be mentioned the **Amrit Mahal** breed of Mysore, a breed possessed of great endurance, activity, and strength, though poor milkers; the **Nellore** cattle, which are good milkers and suited also for slow heavy draught; the **Malwi** breed, which is equally suited for plough and cart and well-work, though, like the Mysore

cattle, poor milkers; the Gir and Kathiawar cattle, which are excellent milkers and good general workers, though slow and very lazy when they get old.

### Sheep

The number of sheep in India is considerably less than half that of the cattle, and the breeds of Indian sheep are poor whether regarded as wool producers or for their mutton. Attempts are being made to improve the breed of sheep by introducing Australian merino stock.

Goat flesh is largely used in India instead of mutton, and the number of goats in India is about equal to half the number of cattle, or fully 25 per cent more than the number of sheep.

### Horses

Of horses, mules, and donkeys there are in India under 2,000,000, the number of mules and donkeys being about equal, together, to the number of horses. For some considerable time an effort has been made by the Government of India to improve the agricultural stock of every kind.

### Fisheries

A similar effort, which has met, perhaps, with more success, especially in Madras and Bengal, has been made by the Government to improve and develop Indian fisheries.

In Madras a Fisheries Bureau was started in 1907, and a fresh-water fish farm and two marine fish farms have been started. A successful experiment on the cultivation of edible oysters has been made, and Nilgiri streams have been stocked with trout. Since 1906, when Sir Krishna Gupta was appointed to inquire into the condition of the fisheries, much has been done in Bengal. The bay has been surveyed, and a chart showing the best fishing grounds has been published. Considerable attention, too, has been given to fresh-water fisheries. In the Punjab and in the other provinces steps have been taken in recent years to improve the fisheries.

### Wild Animals

As might be expected, wild animals abound in India. Monkeys are numerous, and there are two kinds of gibbon, several varieties of langurs (the sacred monkeys of India), and various sorts of common monkeys.

The **lion**, which at one time seems to have roamed over the Indo-Gangetic plain, and even in historical times was not uncommon in Hindustan proper and the Punjab, is now confined to the Gir, a forest region of rocky ridges and isolated hills in Kathiawar. The **tiger**, which is still found in every part of India, is gradually being driven by cultivation from its old haunts. The **leopard**, or **panther**, is even more common in India than the tiger, and there is a black variety of it to be met with in the south of the peninsula. The **hunting leopard**, or **cheetah**, which has been tamed and is used for the chase, is a native of the Deccan.

**Wolves** are plentiful in the open country but are rare in the wooded parts; while the **fox** is common in all parts of India from the Himalayas to Cape Comorin. East of the Bay of Bengal the Indian wolf is not met with. A very small kind of fox is met with in Baluchistan. **Jackals** are plentiful, while alike in India, Assam, and Burma wild dogs abound everywhere in the jungle. They hunt in packs, and are said even to attack and pull down leopards.

Wherever in India the wolf is absent the **striped hyena** is to be met with. Hyenas are not found in Ceylon nor in countries east of the Bay of Bengal. Of **bears** there are several sorts to be met with in India. A variety of the European bear is found above the woods of the Himalayas; lower down, in the forests, the Himalayan black bear, which extends on the west to Afghanistan and Baluchistan and on the east to Assam, Burma, and Southern China, is met with. In nearly every Himalayan village there are men and women bearing the marks of an attack by a Himalayan black bear. The **Malay bear**, a small arboreal bear, reaches from the Malay peninsula to the eastern Himalayas; and the **sloth** is found throughout the Deccan and in Ceylon. It occupies the rocky hills and bush and forest jungles, passing the day in caves, and hunting for its food at night.

Except from the forests of **Coorg**, **Mysore**, and **Travancore**, the wild elephant has been driven out of the peninsula, and is now found only along the base of the Himalayas, where it is met with as far west as Dehra Dun. A few also are still to be met with among the hills in the forest tracts between the Ganges and the Kistna. The number of wild elephants in India, Burma, and Ceylon has greatly decreased during the recent years.



The **rhinoceros** is still encountered in the Brahmaputra, the Sundarbans, and Burma, and the **wild pig** is common everywhere even in the cultivated areas. The **wild ass** is hunted in the deserts of Sind and Cutch, and **wild sheep** and **goats** are got among the Himalayas.

Five species of wild cattle are hunted in India, the **yak**, the **buffalo**, the **gaur**, the **gayal**, and the **tsine**; and there are four or five species of wild sheep. Among these are the **great Tibet sheep**, and the smaller **bharal** and **urial**. There are many kinds of goats, too, including the **markhor**, the **tahr**, the **ibex**, and the **gural** or Himalayan chamois. There are only three kinds of antelope in India, but there are many kinds of deer. Of these the spotted deer is the most common.

Birds are numerous, especially birds of prey, **vultures**, **kites**, **falcons**, and **hawks**. Game birds, too, abound, and the **songsters** are many. Of **aquatic birds** the most important are **storks**, **ibises**, **herons**, **flamingoes**, **swans**, **geese**, and **ducks**. **Reptiles** are numerous, and the number of deaths in India from snake bite is in most districts much greater than the number killed by tigers and other carnivorous animals.

### Minerals

The vast alluvial plains of continental India, like those of Northern Germany or of the Netherlands, are without minerals. As has already been pointed out, minerals are found chiefly among the older rocks; and these plains date only from Kainozoic times—are, in fact, entirely **tertiary** or **post-tertiary**. It must not be forgotten, however, that India at present imports great quantities of metals and of mineral products which she herself could produce were her resources more fully developed. Great advances in this respect have been made recently, and it is reasonable to expect that still greater will be made in the near future.

Among the old rocks of the Deccan, minerals, including **coal**, **gold**, **copper**, **tin**, **zinc**, **lead**, **iron**, and **manganese**, are found. **Diamonds**, also, and **rubies** and other **precious stones** are still produced in India.

### Coal and Oil

**Coal** is now the most valuable mineral product worked in India, and the quantity raised has during the last few years been greatly increased. More than 90 per cent of the total coal produced comes from **South-western Bengal** and from the province of **Bihar** and **Orissa**. It is found among rocks thought to be of the same age as those which in England come above the coal measures. Although the coal production in India is small compared to the production of Great Britain

or the United States, it is at present greater than the Indian consumption. The Straits Settlements and Ceylon are the chief markets for Indian coal.

The coal-bearing area of India has been reckoned at over 30,000 square miles. This includes the coal found among the very young rocks in Assam, Sind, Baluchistan, Afghanistan, and Burma.

Coal occurs also in the Punjab, and at the east and at the west end of the Himalaya Mountains oilfields have been found. Those to the west are found in the Rawalpindi district of the Punjab and in Baluchistan; those to the east in Assam and in Burma.

The eastern, that is the **Assam and Burma**, area is by far the most important of the oil-producing districts of India, and Burma is responsible for all but a small fraction of the oil produced, which grew from 50 to nearly 250,000,000 gallons between 1901 and 1911. The oilfield which yields most oil is in the Irawadi valley at Yenangyaung, which produced more than two-thirds of the Indian oil from 1901 to 1911.

### Gold

For ages India has been a gold-producing country. At present the chief goldfield is in **Mysore**, though gold is also found in **Hyderabad**, **Burma**, **Madras**, **Bombay**, and **Kashmir**. The value of the gold produced in India is between two and three millions sterling, being only a little less than the value of the coal produced.

**Copper** is found in **Southern India**, in **Rajputana**, and among the **Himalayas**, and was formerly smelted in various parts of the Empire. **Graphite** is mined chiefly in the south in **Travancore**. **Tin** has been found and mined in **Burma**, though not to any great extent.

**Iron** is found in **Madras** and in the **Central Provinces**, as well as in many other parts of the Empire, though native iron-smelting has almost been superseded, especially near railways, by the cheap iron and steel imported from Europe and America. Most of the iron output is from Bengal and Bihar and Orissa, where the erection of the **Tata Iron and Steel Works** has greatly increased the Indian iron-production.

**Manganese**.—In the **Central Provinces** also there are rich deposits of **manganese**, and manganese ore to the extent of over half a million tons annually is produced. Next to the Central Provinces, **Madras**, **Bombay**, **Bengal**, and **Mysore** yield at present the largest quantity of manganese ore.

**Salt**.—Rock-salt is mined in the **Punjab** and in the **North-west Frontier Provinces**.

All the salt mines except those of Kohat are worked by the Government, which also controls the salt manufacture in Bombay from the salt-soil brine of the Rann of Cutch. The most important inland drainage area source is **Sambhar Lake** in **Rajputana**, from which nearly 150,000 tons are got annually. Though there is a tax on salt,

sea-salt in Bombay is as a rule made by private factories. To prevent the tax from injuring the fishing or the fish-curing business, curing yards at which salt is sold at cost price have been set up in all the important fishing centres.

**Precious stones**, including diamonds, rubies, sapphires, and garnets, are found. **Diamonds** are found in the old rocks of Southern India and among those of the Vindhya Mountains. Burma is the great **ruby**-producing country. In Burma rubies, next to petroleum, are the chief source of revenue. **Sapphires** are found in Kashmir, and **garnets** among the Aravalli Hills in Jaipur.

**Building stone**.—India as a whole is well supplied with excellent building stone. These include **granites**, of which most of the great temples are built, **sandstones**, which was the material used in building most of the forts, palaces, mosques, and tombs by the Mogul rulers, though the Taj is built of white marble. Porbandar limestone from Kathiawar is largely used for buildings in Bombay.

It is thus seen that the great bulk of the minerals of India, including coal, gold, and precious stones, are found in the old rocks of the Deccan. The rubies and sapphires of Ceylon are specially famous, and the island yields also gold, iron, and plumbago.

## MANUFACTURES

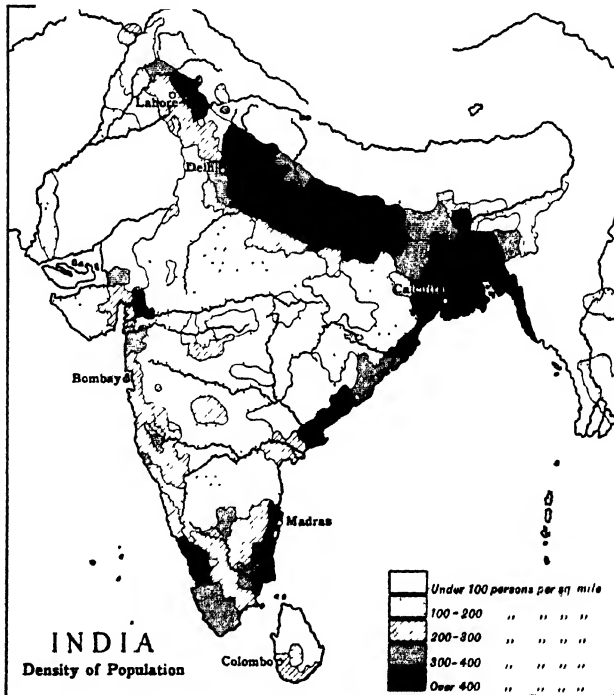
### Cotton

India is almost entirely an agricultural country; but it was from very early times noted for the skill of its artisans; for the excellency of its work in metal and ivory; and for the fineness of its woven fabrics.

Machine-made articles have largely taken the place of the old hand-made products; and India is now to some extent becoming an exporter of manufactured goods and an importer of raw materials.

This is growing yearly more and more the case. Hand-made articles even in India are unable to compete either in price or in quality—save in a few special cases—with the machine-made articles, the consequence being that small industries and local handicrafts continue to decay rather than to improve. This is less due to the difficulty of meeting the competitions of the manufactured articles than to the obstinacy with which the native workman clings to the received methods of production and resists all attempts to introduce improvements.

Next to cultivating the fields the most important native industry is still, as it has always been, the weaving of cotton fabrics. Cotton is one of the native plants of India, and supplies by far the most important material for the clothing of the people. About half the cotton grown in India is used in the spinning factories of the country, and the remainder is available for export. The greater part of the cotton cloth



used in India is, however, the product of the power-loom, European or Indian, but there is still a large local demand for particular products of the hand-loom, and this the power-loom has not yet been able to meet. Among the articles which the hand-loom seems specially fitted to produce are the *sāris* (long pieces of silk or cotton cloth which form each the principal garment of a Hindu woman), the *lungis* and *dhotis*, or loin-cloths, worn by men (lungis are turbans with a check or

gold border, though the name is sometimes given to a check worn by Muhammadans as a dhoti), and the **chadars** or shawls, and other articles of dress. These are produced by the native weaver rather than in the factory. Except in Burma and Assam, where the weaving is done by the women of the household, the hand-loom weavers of India are mostly males.

The **kheses**, thick checked cottons, of **Derajat**, and the lungis of **Kohat** and **Peshawar**, are famous all over the East, while the striped cotton fabrics of **Shahpur** and **Multan** and the glazed **ghāti** fabrics of **Jullundur** are also generally well-known. These are part of the cotton produce of the Punjab. Cotton-weaving of particular cloths is carried on at **Benares** and numerous other places in the United Provinces. The double-pattern fabrics of **Aligarh**, the checked and striped **gabrunns** from **Agra**, and the damasks of the **Rampur State** have all a considerable local market and are good of their kind. In the Central Provinces the most famous cloths are those of **Umrer** in the Nagpur district, and of **Pauni** in **Bhandara**.

Schools for teaching hand-loom weaving have been set up over a large part of India, and these may be the means of improving the methods and adding to the artistic excellence of the articles produced, and so enabling the hand-loom, in the case of articles of cotton, to hold its own with the power-loom. That India even then will be able to produce finer articles than it did formerly does not seem at all likely. **Dacca**, once famous for the fineness of its muslins, is now noted for the manufacture of **jhappans** and **kasidas**, which are sent to Turkey and other Muhammadan centres.

Of the total factory output of cotton goods, the Bombay mills produce between 80 and 90 per cent. Three-quarters of the cotton consists of coarse unbleached cloth.

There has been a steady increase in the quantity of cotton goods exported from India. The Straits Settlement and Ceylon are the largest purchasers.

In recent years there has been a considerable development of factory manufactures, and the Government of India has to some extent used its powers to promote home industries. The cotton and jute mills of India now compete with those of Manchester and Dundee. Bombay alone contains over eighty cotton mills, and these and the mills elsewhere do much to supply the native market. English-made cotton goods, however, are still much sought after.

## Jute

As **Bombay** is the great cotton-manufacturing town of India, **Calcutta** is the great jute-manufacturing town. Jute, the raw material of the manufacture, is entirely a product of Bengal, and this gives a considerable advantage to Calcutta over its great rival, Dundee. It was from Dundee that the jute manufacture was introduced into Calcutta,

and its progress since its introduction has been steady. It is calculated that at present there are between eight and nine millions sterling invested in this industry, in which between thirty and forty thousand looms and nearly three-quarters of a million of spindles are engaged, while the industry gives employment to between two and three hundred thousand people.

### Silk

While the cotton workers number more than 2 per cent of the entire population, the number engaged in silk-weaving is comparatively small.

**Bengal** is the chief silk-producing province. Under the East India Company the production of raw silk was encouraged, and quantities of raw silk were produced, chiefly in Bengal, and exported to Europe. The introduction of silk-growing into Italy and France made the trade unprofitable, and it has almost died out. At present India imports a much larger quantity of manufactured silk than it exports, while the raw silk exported equals in value the raw silk imported.

There are three varieties of silkworms natives of India, the **Tasar**, the **Muga**, and the **Eri**. The **Tasar** is widely spread. It lives on the lower hills, especially on the lower hills of the Central tableland, and it feeds on various jungle trees, particularly the baer. It is of the same species as the tasar worms of Japan and China. The **Muga** feeds on the laurel, and is confined to Bengal and Assam. To these provinces also the **Eri** is mainly confined. The **Eri** is semi-domesticated, and is reared on the castor-oil plant.

Nurseries have been established to supply the silk-growers in India with pure seed. The chief of these is at **Berhampore**. The growth of mulberry silk has been introduced into the United Provinces, the Punjab, and the North-west Frontier Provinces, and there silk-growing promises to become an important industry. At present large imports of raw silk are made into India from China and elsewhere.

The Bengal factories work up mostly the native tasar silk; but many varieties of silk fabrics are made in different parts of India. **Brocades** are made in Bengal, in the Punjab, in Bombay, in Southern India, and in Kashmir; **striped silks** all over Northern India, and **satinettes** in the United Provinces and Madras. Both raw silk and woven silk are exported from India; but, in both cases, the imports greatly exceed the exports.

The gold brocades for which, in particular, India was famous, are still made at **Agra, Benares, Ahmadabad, Baroda, Surat, and Burhanpur**, and at **Aurangabad, Tanjore, and Trichinopoly**. Silk brocades without the gold or silver wire are made at the places already mentioned as noted for gold brocades, and also at **Multan, Bahawalpur**, and at **Nasatpur** in Sind. Pure silks or silks mixed with cotton are woven in all parts of India, and were at one time in great demand. They cannot now, however, compete with the cheaper imported articles.

The striped silks are produced chiefly in the Punjab at **Amritsar, Multan, and Bahawalpur**; at **Agra, Azamgarh, Mirzapur, and Benares** in the United Provinces; at **Murshidabad and Bankura** in Bengal; at **Karachi, Surat, Tatta, Poona, Yeola, and Thana** in Bombay; and at **Berhampur, Madura, and Dindigul** in Madras.

The embroidered silk *sāris* of Kathiawar are noted throughout India for the fineness of their colouring. Silk is largely used by the people of **Burma**, both men and women, for their dresses; but though there is in consequence a large demand for silken goods in the Province, the silks produced are said not to be of as good quality as those produced in India. The silk manufacture is said to have been introduced into Burma by colonies of Manipuris, who had been taken prisoners and led into captivity by the Burmese kings. The manufacture is mainly the work of women, and is carried on chiefly in the district round **Mandalay**.

### Woollen

For woollen manufactures, especially for carpets and shawls, India has long been noted. **Carpet-weaving** is carried on in all parts; the carpets of Kashmir, of the Punjab, and of the Central Provinces are famous. Carpet-weaving also flourishes in Rajputana, in Central India, and in Bombay.

Shawls are produced chiefly in Kashmir, though shawl-weaving is also carried on in the Punjab. The shawl manufacture in Kashmir has almost ceased since the Franco-Prussian War of 1870 and the famine that followed and drove the weavers to migrate into the Punjab.

The woollen manufactures of India are in comparison of very secondary importance. While all over the country coarse woollen blankets, carpets, and other woollen fabrics are produced, it is only in Northern India, and particularly in Kashmir, that highly finished and artistic woollen fabrics are made.

The number of woollen mills is very small, but there has been an increase within the last few years both in the number of mills and in the number of spindles. The Indian woollen factories make cloth, generally from Australian wool, for use in the army and among the police.

**Dyeing** is an industry closely connected with the textile manufactures, particularly with those of silk, woollen, and cotton. India produces many natural dyestuffs, such as **indigo**, **lac**, **turmeric**; and from these the fine colours for which the country was noted were produced. In recent times the rush into India of cheap aniline dyes has made the work of the native dyer less satisfactory. Indeed, of recent years the natural dyes of India have been less used, and the native workers have shown less skill in preparing them.

### Other Manufactures

At present none of the other manufacturing industries of India approach in importance those of cotton and jute. The factory population is largest in Bengal; Bombay comes next, and then Madras, and the United Provinces. In Bihar and Orissa there are sugar, tobacco, indigo, and lace factories; in the Central Provinces cotton mills; and in the Punjab cotton and woollen factories, carpet factories, and flour mills. Assam has a petroleum refinery, mills, and saw-mills; and Burma has, in addition to these, numerous rice-mills.

There has been a decrease rather than an increase in the output of Indian paper-mills. The Indian mills with their older methods do not seem able to produce papers that can compete with the cheap imported wood-pulp papers.

### Working in Metals, &c.

Nearly all over India, working in metals, the manufacture of gold and silver plate and of ornamental articles in silver and gold is carried on. The natives excel also in wood and ivory carving, and in inlaid work in wood or ivory or in both.

The former excellence of Indian ironwork may be judged from the Kutb Minar pillar of wrought-iron near Delhi, one of the finest pillars in the world; and from the many splendid examples of wrought-iron gates and of different kinds of weapons that are to be met with in various parts of the country. The Burmese as well as the people of India show great skill in the production of wrought-iron articles. In some parts of India, notably in **Rajputana**, the manufacture of swords, daggers, shields, and helmets is still carried on.

Indian woodwork has long been famous. Besides the carving applied to architecture, to cabinet work, to inlaying with different kinds of wood, to veneering, and to lattice work, there is that peculiar feature of Indian art handicraft, lac-turnery, which is carried on in almost every Indian town of any note, as is also etched lac-work



with floral designs. Burmese lacquer-work, though the export is at present very small, is locally an important industry.

**Delhi, Murshidabad, Mysore, Travancore, and Moulmein** are all noted for their production of carved ivory articles, caskets, glove-boxes, chess-men, papercutters, card-cases, and the like.

For artistic excellence the ivory carvings of Mysore and Travancore are held in the highest esteem. Ivory turning is even more widely spread than ivory carving, and of it **Agra** is said to produce the best specimens. Ivory inlaying is practised in several parts of India, and the inlaid work of **Mysore, Hoshiarpur** in the Punjab, and **Monghyr** in Bengal is thought of special excellence.

**Enamelling in metal** is another of the arts for which India, like China and Japan, has long been famous. **Jaipur** stands pre-eminent in this art, though it is said that of late many of the most skilled workmen have moved to Delhi. The Jaipur work is always done on the purest gold, which enables the workmen to secure the greatest possible range of colours. Besides Jaipur, **Bahawalpur** and **Bhuj** in Cutch are important gold-enamelling centres.

**Multan, Lucknow, and Rampur** are noted for their silver enamels, while the copper or brass enamelling of Kashmir is well known. The chief centres for the production of gold and silver plate are in Southern India, **Bangalore, Mysore, Travancore, Madras City, Trichinopoly**, and the district of the Godavari.

The distinguishing mark of Indian gold and silver plate is the **Swami** work, which is composed almost entirely of mythological medallions and of canopied niches. Of Bombay work in silver, the best examples are provided, after **Poona**, by **Bijapur, Sholapur, Ahmadabad, and Baroda**.

Of the two styles known as Bombay silver-work, one is a bold repoussé taking its name from **Poona**, and the other is of flat intricate floral design and takes its name from **Cutch**. **Lucknow, Calcutta, Cuttack, Dacca, and Monghyr** are all noted for their manufactures of silver plate; while the filigree-work of **Trichinopoly, Rangoon, Jhansi, and Dacca** is also worth remembering.

**Damascening** is another art that has been practised in India with very great success. The chief damascening centres are **Sialkot, Gujrat, and Lahore** in the Punjab; **Jaipur, Alwar, and Sirohi** in Rajputana; **Datia** in Central India; **Hyderabad** and **Travancore**.

Of encrusted wares there are three kinds: **Tanjore** ware, in which the applied metal is raised above the surface; **Tirupati**, in which the

metal is left level with the surface; and **Bedri** (from Bedar), in which the metal is left below the surface.

Brass and copper vessels with silver encrustation are common. Ornamental work in copper and brass is carried on in many different parts of India. Many of the most beautiful and most interesting of the copper and brass articles made in India are intended for religious services.

**Ornamental copper and brass work** is made largely in Kashmir, Nepal, and Sikkim, and in the Punjab at **Lahore** and **Amritsar**. Lucknow is noted for its manufacture of ornamental copper articles, and **Benares** for its ornamental brass-work.

Central India, Rajputana, several of the towns in Bombay, Madras, and Mysore produce work of this kind in brass and copper. **Jaipur** produces specially artistic brass-work, and the gongs and images of Buddha from Burma are well known.

What is known as Indian jade comes from Afghanistan, and is shaped by Indian lapidaries into cups, caskets, swords, and dagger handles, and articles of a similar kind. Progress in pottery manufacture has probably been retarded by the want of a supply of kaolin or China clay. The artistic skill of the Hindu has been chiefly expended on the production of vessels to store grain and spices, and not on the production of eating or drinking utensils.

### Pottery

Indian pottery is of two kinds: the **non-glazed** pottery or **terra-cotta** ware, much of it the work of the village potter; and the **glazed ware**, a kind of artistic pottery which seems to have originated in the need for tiles to decorate the tombs; and which, with the exception of the pottery of Vellore, is entirely Muhammadan. In Southern India terra-cotta pottery of a good quality and style is produced in a number of centres. In many cases the terra-cotta or unglazed figures are painted after they have been fired.

**Glazed pottery** is recognized as consisting of quite a number of kinds. The **Peshawar pottery**, which is like majolica, is green and pink on a milky white. The pottery of **Delhi** and **Jaipur** being of ground felspar mixed with gum or starch, cannot be shaped on the wheel but has to be moulded by hand.

The artistic pottery of **Multan**, with its deep blues and whites, has disappeared, and the present turn-out is poor. The **Vellore pottery** is

of a fine white clay which yields to the most delicate treatment. When glazed it is either in a clear emerald-green or a deep dull-brown. From very early times the **pottery of Burma** has been famous. Everywhere in Burma earthen vessels are made, and in these all cooking is done, but the potter's trade is not so much a special village industry in Burma as it is in India proper.

## THE PEOPLE

### Anthropological Data

Judged by their colour, their height, the shape of their head, and other characteristic marks, the peoples of India have been divided into seven main types, or, if the Andamanese islanders be included, into eight.

Among the peoples of India there are the greatest differences in the colouring of the skin.

The **Andamanese** and the **Dravidian** are black, and all shades between that and the creamy colour of the skin of the **Kashmirian** are to be met with.

The hair of the great bulk of the people is black or dark-brown, and the eyes are almost generally dark-brown, though grey eyes are met with in Bombay among the Brahmans, and blue eyes are not uncommon among the peoples of the North-west Frontier.

A careful study has been made of many of the most distinctly marked tribes of Northern India, including the tribes of Bengal, Bihar and Orissa, the United Provinces, and the Punjab. From the figures thus got, it has been found possible to group the tribes into three main divisions. These have been called the **Aryan**, the **Dravidian**, and the **Mongoloid**.

This threefold division has been confirmed by the careful examination and measurement of a large number of skulls to find out, among other things, the relation between their length and breadth and by the examination of a large number of noses to ascertain what ratio their breadth bears to their height.

India may be described as a country mainly of long-headed and of medium-headed peoples, separated by the Himalayas from broad-headed types on the north; and on the east and west separated by dependent mountain loops from peoples who must still be classed as broad-headed, though not nearly so markedly broad-headed as the peoples to the north.

In the Indian Empire fine noses are limited to the peoples of the Punjab and Baluchistan, the population of the rest of India being characterized generally by medium noses, though the Dravidian tribes have broad noses.

Another important physical feature in the grouping of peoples, and in enabling one race to be distinguished from another, is stature. Individuals and races are grouped as tall where the stature is over 5 feet 7 inches, above medium where it is between 5 feet 5 inches and 5 feet 7 inches, medium where the stature is between 5 feet 3 inches and 5 feet 5 inches, and short where the stature is less than 5 feet 3 inches.

With regard to height, it seems established that climate, soil, height of abode above sea-level, food supply—abundance or the opposite—occupation, and many other conditions help to determine the stature of the individual, but race difference is in this respect one of the chief determining factors.

In India it seems that race difference plays an even more important part with regard to height than it does elsewhere. The tallest races are to be met with in Afghanistan and Baluchistan, in the Punjab and Rajputana, and a steady decline in height can be traced in the people as we proceed eastwards down the Ganges.

The lowest average stature is among the Abors and other Mongoloid peoples dwelling in the hills of Assam. The people of the Deccan are not so tall on the average as the people of the Indo-Gangetic plains. The shortest peoples of the Indian Empire are the Negritos of the Andaman islands, whose mean height is said to be only 4 feet 10½ inches.

### Races of India

The races of India have been arranged for convenience as **Turko-Iranian** in the north-west, occupying Afghanistan, Baluchistan, and the North-west Frontier Provinces. They include the **Brahuis**, the **Balochs**, and the **Afghans**. They are rather above the medium height, with broad heads, prominent noses, fair complexions, and dark eyes.

The **Indo-Aryan**, occupying the Punjab, Rajputana, and Kashmir, are a tall fair race with dark eyes and hair. They have long heads, and narrow and prominent noses.

The **Scytho-Dravidians**, including the Maratha Brahmans and the Coorgs, &c., are distinguished from the Turko-Iranian of the north-west by a lower stature, greater length of head, a narrower though shorter nose, and a flatter face. They are probably sprung from a mixture of Scythian and Dravidian elements.

The **Aryo-Dravidians**, or Hindustani, are found in the United Provinces, in Bihar and Orissa, and in parts of Rajputana. Their heads are long to medium; their complexion varies from light-brown to black; and their noses from medium to broad.

The **Mongolo-Dravidians** occupy Bengal and Bihar and Orissa. They stretch as far east as the hill country of Chota Nagpur. Their head is broad, their complexion dark, their stature medium, their nose medium to broad.

The **Mongoloid** type occupies the Himalayas, Nepal, Assam, and Burma. They have a broad head, a dark complexion with a yellowish-tinge; scarcely any hair on the face, which is decidedly flat; and the nose is fine to broad. They have often the oblique eyelids so distinctively Mongolian.

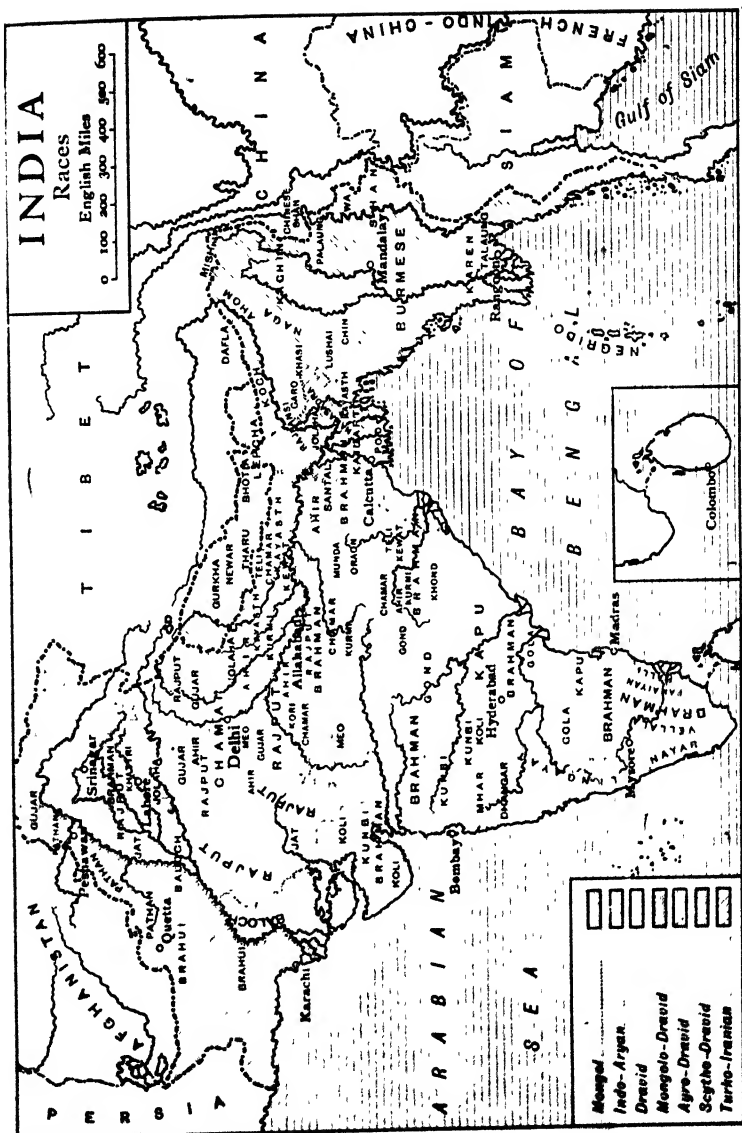
The **Dravidians** occupy the whole of the eastern part of India from Ceylon to the valley of the Ganges. They occupy also most of the Central Provinces, Central India, and Chota Nagpur. They are as a rule of less than medium height, with dark almost black skins, long heads, and broad flat noses. Their eyes are black, and their plentiful hair shows a tendency to curl.

To the people of the **Andaman islands** a special interest attaches. They are a branch of the Oceanic negroes who until recently have lived from the remotest ages quite apart from the rest of the human race. They are the tallest of the Negritos, averaging among men from 4 feet 9 inches to 4 feet 10 inches; while the average height of the women is about 4 feet 6 inches. At no great distance from countries where civilization made remarkable advances thousands of years ago, the Andamanese are savages as low in the scale as any in the world. Even for numbers they have no name in their language higher than for two, though it is said that by some device they manage to count up to ten. They were reputed cannibals, though they now deny that. They are, as one would expect, exceedingly hostile to strangers. Their neighbours, the people of the Nicobar islands, do not belong to the Negrito stock. They are Malaysians of a rather low type with oblique narrow eyes, flat faces, and a yellowish or reddish brown complexion.

### Occupation of India

The Dravidians, like the rest of the races inhabiting India, do not, according to one view, seem to be indigenous. They appear to have made their way into India in very early times from two distinct directions, and to have belonged to two separate branches of the Dravidian stock.

The **Kolarians**, who were the first comers, entered India from the north-east and made their way across the Indo-Gangetic plain to the Vindhya tableland. Later, but how much later it is difficult to say, the main body of the Dravidians entered the country by way of Gilgit and the north-west passes, and conquering and splitting up their prede-



cessors into fragments, forced their way into the southern peninsula, as well as into the northern plain.

This is one view; but there is another, at least as reasonable, which holds that there is no satisfactory proof of the trans-Himalayan origin of the Dravidians, and that as far as we know they were the earliest inhabitants of India.

The Dravidians were followed by the Indo-Aryans, who entered India also from the north-west, and after a long fierce struggle made themselves masters of a considerable part of the country. This they completely Aryanized, impressing upon it their language and their culture.

When they entered India they brought their wives and families with them, and they do not seem to have intermarried with the Dravidians whom they found already in possession of the country. In no other way can the comparative purity and homogeneity of the Jats, Rajputs, and other races in Northern India be accounted for.

It seems probable that the Aryans were driven eastwards from the tablelands of Eastern Persia, Baluchistan, and Afghanistan by the gradual diminution of the rainfall in those regions, and that they entered India really as organized and civilized communities. A second Aryan wave, driven forward by changes of climate in Central Asia, found the Punjab held by their brethren, and pressing onwards established themselves in the plains of the Ganges and the Jumna. Here they came in contact with Dravidian peoples, and here caste had its origin. In this sacred middle-land the Vedas or Sanskrit Scriptures were written, and the whole elaborate system of religious ritual was developed.

Farther east the bulk of the population, as has been said, is Dravidian mixed with Mongolian.

There are no accounts of Mongolian invasions, but a considerable peaceful penetration of India from the east and north-east and a mixture of Mongolian and Dravidian blood seems necessary to account for the races that occupy the north-eastern part of the Indian Empire.

In Bihar and Orissa, and in Bengal and Assam the bulk of the population is Dravidian, with a very considerable infusion of Mongolian blood.

The tradition of the Brahmins and Kayasths of Bengal, that their ancestors came from Kananj to introduce Vedic ritual into this eastern part of India, is supported by the distinctive features of these castes.

Tribal struggles, while they resulted in a settled form of government in China, led probably to the unsuccessful tribes

being expelled and forced to seek new homes for themselves. Wave after wave of these peoples, known variously as **Scythians, Mongols, Parthians, Huns**, has, even in historical times, swept over parts of **India**, breaking into the country from the north-west.

Between the times of **Cyrus the Great** and **Darius**, who was overthrown by **Alexander**, the **Scythians** were forced from **Southern China** into **Bactria**. Later they were driven over the **Koh-i-Safed**, and forced to take up their abodes in what was called after them **Sakastan** or **Scistan**; and later still, about 2000 years ago, some of them were driven farther eastward and established themselves in the **Western Punjab**. Successive swarms of these **Sakas** poured into **India**, of which they conquered parts.

According to all accounts they were a short, sturdy, broad-headed race of nomads, skilful in the use of the bow, and predatory in their habits. By mixing with the natives they established a type which can be traced by its broad head and other peculiarities from the western **Punjab** as far south as **Coorg**. They seem, after their invasion of **India** about the beginning of the **Christian era**, to have adopted an **Aryan** speech; and, as looks not improbable, after mixing with the **Dravidians**, to have become the forefathers of the **Marathas**. The **Marathas** by their wide ranging forays and their guerrilla methods of warfare, continued into quite recent times the nomadic and predatory habits of their assumed **Scythian** ancestors.

As the **Mongoloid** and **Mongol** tribes on the north-east penetrated slowly to the **Ganges valley**, they formed with the earlier **Dravidians** a type of race to which the name **Mongolo-Dravidian** has been given.

In the west there seems to have been since the beginning of historic times a slow settlement in parts of **India** of tribes from **Persia**.

These **Persian** tribes conquered in historic times much of the north-west of the **Empire**; but it was not till the conquest of their own country by the **Arabs**, towards the close of the seventh century, that the **Persians** were driven to seek in **India** that religious tolerance they were not allowed in their old home.

**Arabs, Turks, Pathans, and Mughals** have in historical times invaded **India** and conquered larger or smaller parts of it as the case happened, thus making the race problem, already exceedingly difficult, still more involved. The problem was still further complicated when the sea-route to **India** was discovered.

Previous to the end of the fifteenth century the **Arabs** had been the



intermediaries of much of the trade between India and the west, though, no doubt, part of the trade continued to be conducted by the overland route through Persia and Syria. The first Europeans to settle in India for trade purposes were the **Portuguese**, to whom the name of **Feringhee** was given. These were followed later by the Dutch, the French, and the English. Yet it is astonishing how slight an effect the settlements of Europeans in India has had upon the races of that country. No doubt this has been largely due to the fact that the climate of India is not suited to Europeans, and that European children born in India must be sent home if they are to grow up.

### The People of Ceylon

Ceylon is as much a part of India ethnographically as it is geographically. In climate and in physical structure Ceylon is a mere continuation of the Deccan, with which it is nearly joined by submarine ridges, and in race the people of Ceylon is almost identical with the people on the eastern side of the Deccan.

Of the total population of the island, numbering fully 4,000,000, more than five-sixths are Dravidian. These include the **Kandyan** or hill **Sinhalese** and the **Sinhalese** of the low coast lands, numbering between them over two-and-three-quarter millions, and the **Tamils** of Northern Ceylon, who number fully a million.

### Veddahs and Todas

As in Southern India the **Todas** of the Nilgiri Hills stand quite alone among their Dravidian surroundings, so in Ceylon the **Veddahs** seem the remnant of an earlier primitive race; that was overwhelmed and submerged by the advancing tide of Dravidians. Some ethnologists are inclined to consider that the Veddahs belong to the great Caucasian or white race. They are very different, however, being small of stature, and having projecting jaws, flat noses, and prominent teeth. Whether we are or are not to consider these Veddahs and Todas as parts cut off from a once much more widely spread white race is doubtful. The Todas are a tall, sturdy race, with straight noses, regular features, and thick lips, in many ways closely resembling the blacks of Australia. The Veddahs of Ceylon, though they have been almost within touch for ages of the civilized Dravidian races, are amongst the most primitive savages in the world.

### Kolarians

Thrust back from the plain, according to some ethnologists, and forced to take refuge in the recesses of the mountains, there are numerous detached tribes throughout India who differ

utterly, except in language, from the civilized Dravidians by whom they are surrounded.

They are, like the Veddahs, among the least civilized of the races of mankind, and often betray markedly negroid characteristics. No general name has ever been given to these hill tribes. It has been proposed by some ethnologists to call them **pre-Dravidians**, so as to mark their true ethnical relation to the rest of India. Others are inclined to call them **Kolarians**, indicating by the name their opinions that these are the descendants of the Eastern Dravidian branch which is supposed to have entered India first, and which seems to have had diffused through it a considerable mongoloid element.

The small, dark, slender, but active **Bhils**, who find in war and robbery their chief pleasure, are scattered over a large part of India. Their huts in the forest are made of sticks covered with long grass. The **Kotas**, a long-headed race like the **Todas**, and like them, unfortunately, very fond of intoxicating liquors, are settled also among the Nilgiri Hills, as are the **Irulas**, **Badagas**, and **Kurumbas**. When they do not dwell in mere holes, or in clefts in the rocks, the dwellings of these people consist simply of branches piled up like heaps of brushwood. Most of them are short and ill-made, with weak eyes, wide mouth, and prominent teeth. Their arms and legs are almost entirely without muscles, and look more like sticks than human limbs.

The **Khonds** and the **Kaniyans** are two very remarkable Indian races. The **Khonds**, who have to the west of them, in the highlands to the north of the Deccan, the **Gonds**, are said to have been in the habit of killing their baby girls, saying they were too poor to keep them, and of sacrificing human beings to their gods. They are on the whole a finer race than their western neighbours. They seem of mixed Aryan and Dravidian blood, as the **Gonds** are mixed Mongol and Dravidian. The **Kaniyans**, who are greatly esteemed as diviners, follow the seemingly incongruous occupation of soothsayers and umbrella-makers.

## LANGUAGES

The people of India, as might be expected, speak a great variety of languages, and are broken up into a great number of tribes differing from each other in their language, in their religion, and in their customs.

Some of the languages current in India, of which there are several hundreds, are spoken only by a few people; while others form the means of communication of many millions. Five great families of human speech have their home in India, where they are used as the mother tongues of the natives. These are the **Aryan**, the **Dravidian**, the **Mon-Khmer**, the **Munda**, and the **Tibeto-Chinese**. The oldest languages of India are probably

those classed as Munda; but, considering the numbers and the highly civilized condition of those using them, we must give the first place to the **Indo-Aryan** languages. The Indo-Aryan languages are the native speech of fully two-thirds of the people of India. Bengali is spoken by about one-fifth, Western Hindi by nearly as many, and Eastern Hindi by about one-tenth of the people of India. Nearly a tenth, too, speak Panjabi, and about the same proportion Marathi.

### The Aryan Languages

The Aryan languages of India are merely a branch of the great **Indo-European** family of speech. The Indo-European languages are spoken by the bulk of the people of Europe, by the bulk of the most highly civilized peoples of South-western and Southern Asia, and by the bulk of the inhabitants of Northern and Southern America and Australia. Following the ordinary process of language development, the highly synthetic Aryan tongue, which was the vernacular speech of the tribes of Aryans who forced their way into the plain of India, has given rise to numerous analytic rather than synthetic forms of speech. What the original home of these Aryans was is a very difficult matter to settle, and many of the terms used in linguistics and ethnology show the opinion as to the origin of the Aryans held at the time when they were coined. **Caucasian** was the name given to the branch of the white race speaking these languages, on the supposition that the Caucasus was their original dwelling-place. By others the term **Iranian** has been applied to the family of languages to indicate their belief that the people who spoke the original tongue from which all these different languages are derived had their earliest abode in the plateau of Iran not far from the foot of the Hindu Kush. By others the original home of the Aryans has been proved to be in Central and South-eastern Europe. On a comparison of the evidence it seems more probable that the original home of the Aryans was in the common borderland between Europe and Asia, the steppe country of Southern Russia.

### Eranian Languages

On the western borders of India the languages spoken are offshoots of the languages spoken in old Persia, Persic or Indic, which were both Indo-European tongues. These include Baloch, the languages spoken in Baluchistan, though it must be recollected that the hill tribes to the south-west of the Sulaiman mountains use a Dravidian form of speech which breaks up the **Baloch** into a northern and a southern. The southern is called **Makrani**. **Pashto** is the chief language of Afghan-

istan, and, unlike Baloch, is a written language, with an alphabet of its own and an important literature.

### Pisacha Languages

A different and less important group of Indo-European languages is spoken by the tribes in the north-east of Afghanistan, and by those in the north-west of British India. These have been grouped as the **Kāfir**, the **Khowar**, and the **Shinā** languages. The tribes speaking these languages seem to have branched off from the original Indo-European stock at a very early period, and are spoken of contemptuously by the Aryans who made their way into India by the Khyber and other passes in the north-west. By them they were called **Pisācha**, or flesh-eaters, and this is the name given to the group of languages spoken by these tribes. **Kashmiri**, the language of Kashmir, must not be grouped with these languages of Kafiristan and the Pamirs, though Shinā, a Pisachian speech, is the basis of Kashmiri, as it is of several other dialects spoken in the Indus basin in the north-west.

The Pisachian languages are without literature, and have only been reduced to writing in recent years by the labours of European scholars.

### Indo-Aryan—Central

The midland portion of the Indo-Gangetic plain was the region where the Aryan and Dravidian, the former the conquerors and the latter the conquered, came into conflict, and where during the struggle the caste system was evolved. This was the "Holy Middle Land" of later Indian tradition, known also as Aryavarta or the home of the Aryans; and there **Sanskrit**, the literary language, was fixed, and the **Vedas** or Sacred books of the Hindus, the earliest literary work of the Aryan mind, were written.

These collections of hymns are thought to be from 4000 to 6000 years old. This sacred middle land stretched from the Himalayas to the Vindhya, and included a great part of what is now known as the United Provinces, part of Gwalior, the Central Indian Agency, and the Central Provinces. The oldest collection of hymns, the **Rig-veda**, seems to have originated in the Upper Doab between the Ganges and Jumna. The language now spoken in this part of the country is called **Western Hindi**, and is spoken by between forty and fifty millions of people.

### Indo-Aryan—Intermediate

On three sides of this Western Hindi land are people speaking languages nearly akin to the Western Hindi. On the north

along the Himalayas are people speaking some variety of what are known as the **Pahari** languages. These are grouped as eastern, middle, and western. To the west of the Central belt are people speaking **Rajasthani**, and farther west still those who speak **Gujarati**, while to the north-west the dialects of the people are known as **Panjabi**. On the east of the Western Hindi are what are known as Eastern Hindi-speaking peoples.

This forms an inner border of what may be called more nearly related languages. These are spoken by nearly as many people as Western Hindi itself. In other words, they are spoken by between forty and fifty millions of people. Eastern Hindi alone is the language of over twenty millions of individuals.

Hindustani, the principal dialect of Western Hindi, is the vernacular speech of the people of the Upper Gangetic Doab, the people about Delhi, which has thus justifiably been made the capital of the Empire. The Mussulmans who adopted Hindostani as their speech used Persian characters to record it, and added to it a great many Persian words. In this form Hindostani is known as **Urdu**, and Urdu is the language used by Mussulmans all over India. The group of languages known as Western Hindi and Eastern Hindi rival even English in the fullness of their vocabulary and in their vigour and flexibility.

**Eastern Hindi**, the language of Oudh, of Baghelkand, and of Chhattisgarh, has a literature greater in extent than any other of the Indo-Aryan languages now spoken. It is the common speech of about 25,000,000 people and has three main dialects, **Awadhi**, spoken in Oudh; **Bagheli**, spoken in Baghelkhand, and **Chhattisgarhi**, spoken in Central Provinces. In the Central Provinces it meets Marathi, and on the border-land there are numerous intermediate dialects between the two languages.

**Rajasthani** and **Gujarati** dialects are spoken by fully more people than Eastern Hindi. They are the mother tongues of close on 30,000,000 people in Rajputana and Gujarat.

Of **Rajasthani** dialects the western or **Marwari** is by far the most important. The people who use it, merchants and bankers, have carried it all over India. **Gujarati**, the most western of the dialects, closely related to Western Hindi, is spoken in Gujarat and Kathiawar. It has a printed character of its own, and has for 900 years had a copious literature.

**Pahari**, the "Language of the Hills", is a descendant of **Rajasthani**. Some centuries ago bands of Rajputs conquered the Hill tribes and imposed their language on them, and thus arose **Pahari**. The dialects

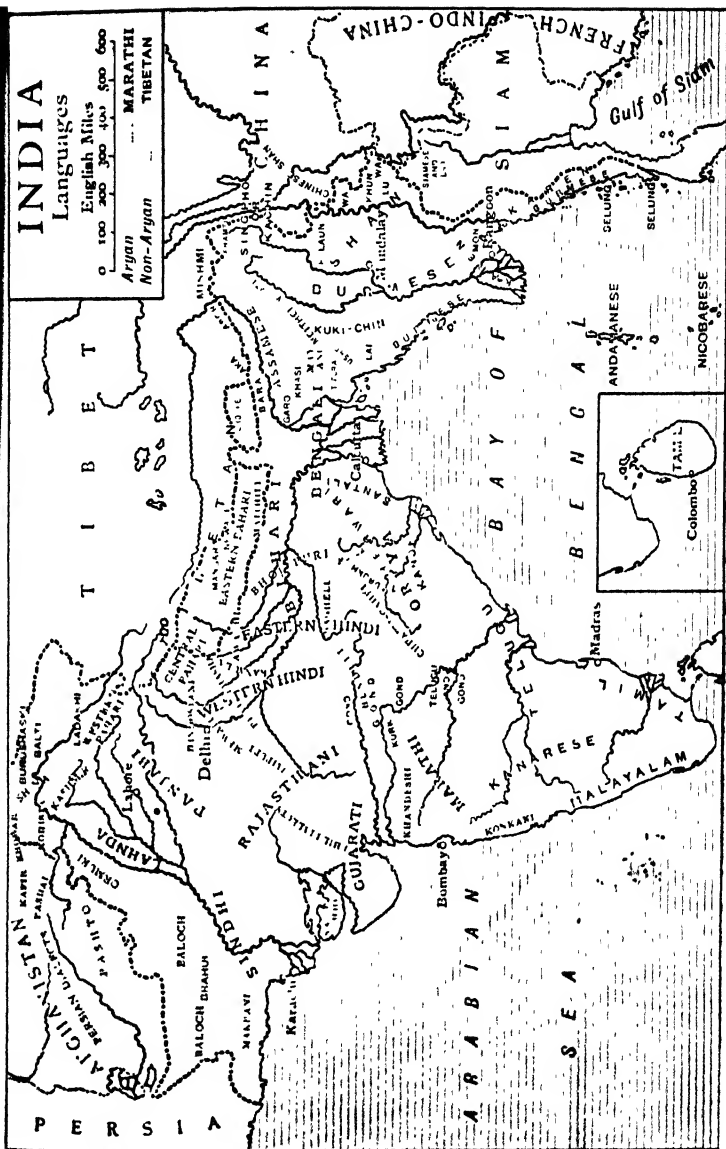
## Languages

English Miles

[illegible]

**Aryan**

**Non-Aryan** **TIBETAN**



are grouped as Western Pahari, Central Pahari, and Eastern Pahari, and are spoken by the ruling classes of the people from the Punjab to Nepal.

**Panjabi**, the mother tongue of the Sikhs, judged by the numbers of people to whom it is their native speech, is next to Eastern Hindi the most important of the languages closely related to Western Hindi. Panjabi has practically no literature, and in this respect differs especially from Eastern Hindi, in which were written the works of **Tulsi Das**, one of the greatest writers India has produced.

### Indo-Aryan—Outer

Considerably more than twice as many individuals speak Aryan languages, less akin to Western Hindi than those given as intermediate. Bengali is spoken by a greater number of individuals than Western Hindi itself is, but the use of Bengali is confined to the province of that name, while Hindostani, the principal dialect of Western Hindi, is spoken all over Northern and Western India, and is the common language of all persons who claim to be educated. The outer group has been divided into a north-western group of languages, a southern group of languages, and an eastern.

The most northern of the north-west group of languages is **Kashmiri**, the language of Kashmir. It has two or three dialects and an old literature of considerable extent, as well as a modern literature. Most of the people now are Muhammadan, so that the ancient language and literature has been almost completely forgotten. Western Panjabi, or, as it is sometimes called, **Lahnda**, is the language spoken by the Hindus of the portion of the Indus valley between where that river enters the plain and its junction with the Sutlej. It has the Panjabi people to the east of it, while the Mussulmans of the region speak **Pashto**, the language of Afghanistan. Lahnda has two dialects, one spoken north of the Salt Range and the other south of it, and has no literature.

Sindhi, the language spoken by the people farther south, is closely related to Lahnda; but as it is the language of Sind, where the bulk of the people are Mussulmans, it has a large infusion of Persian words and, when written, Persian characters are usually employed for Lahnda and Panjabi.

Marathi, the language of the north-western part of the Deccan, including Berar and the north-western portion of the Nizam's dominions and most of the Central Provinces, is spoken by about twenty million people, and has an extremely plentiful and very popular literature.

It has three main dialects, of which "**Desi Marathi**", the dialect spoken in the neighbourhood of Poona, is considered the standard. In the southern Konkan there is a dialect of Marathi known as **Konkani**, which differs so greatly from standard Marathi that those who speak it claim to consider it a distinct language. The Marathi of **Berar** and the **Central Provinces** is the third dialect.

In the eastern part of the United Provinces, in Chota Nagpur, in Bihar and Orissa, and in the north-east of the Madras Presidency, and the eastern part of the Central Provinces, **Bihari** is spoken in the north and **Oriya** in the south. Farther east **Bengali** is spoken in the Province of Bengal, and **Assamese** in the north-east along the Himalayas.

These make up the eastern group of Indo-Aryan languages, which differ more from Western Hindi, the speech of the Midland, than the intermediate languages do. Taking into account the number of people to whom these languages are the mother tongue, this eastern group is the most important group of all. These languages are the native speech of nearly 100,000,000 people. Bengali alone is spoken by about fifty, and Bihari by about forty million people.

Bihari, the language of the northern part of the new provinces of Bihar and Orissa, of the eastern part of the United Provinces, and of the Chota Nagpur plateau, is the language spoken in the part of India where **Buddha** preached and **King Asoka** had his capital.

Bihari has three dialects: Maithili, spoken in the north of the region in Tirhut; Magadhi, spoken in the south of Bihar; and Bhojpuri, the dialect spoken in the east of the United Provinces and in the west of Bihar.

**Maithili** was the language of Nepal before the Rajput invasion. It has a very complicated grammar, and a very small literature dating only from the fifteenth century. **Magadhi**, though the language in which Buddhism was first preached, has no literature, and the people who speak it are as a rule poor and uneducated. **Bhojpuri**, a form of which is also in use in Chota Nagpur, is a most flexible form of speech, not overweighted with grammatical forms and rules, and so is easy to learn.

**Oriya**, the language of Orissa, and of the neighbouring parts of Madras and the Central Provinces, has scarcely changed during the five hundred years it has been in use. It is a musical language with a simple but complete grammatical system and a fairly large literature of considerable merit.

**Bengali** is spoken, as has been said, by a larger number of persons than any other Indian language. It is the vernacular speech of nearly fifty million people occupying Bengal and the Bengali districts of Assam.



It is divided into many dialects, some of which are very corrupt, and the spoken Bengali differs greatly from the written speech. In the latter, numerous Sanskrit words are employed, and the grammatical forms that ceased to be in use centuries ago have been revived. Books are written, it is said, in which no fewer than 90 per cent of the Bengali words are displaced by Sanskrit. This literary style dates from the beginning of last century; before that, Bengal had a poetical literature of its own of considerable extent, written in a purified form of the colloquial speech.

**Assamese** is nearly related to colloquial Bengali, and its claims to be considered a separate language rest chiefly on the fact that it has a very considerable literature embodied in it. It is spoken by about a million and a half of people in the upper and middle valley of Assam.

### Dravidian Languages

The Dravidian people occupy the whole of the east of India from Ceylon to the Ganges, but throughout a considerable part of India the Dravidians have been Aryanized and have adopted Aryan tongues. This is the case of the whole of the region south of the Ganges, and north of the basins of the Godavari and the Kistna. A considerable part of the north-west of these two basins, and all the west coast as far as the south of the Konkan, must be included in this Aryanized India. South and east of these limits Dravidian is the prevailing stock of the languages in use.

Of Dravidian tongues there are two recognized groups, the **Drāvida** and the **Andhra**. Of the Dravida group the most important are **Tamil**, in Ceylon and along the east of Southern India; **Kanarese**, in Mysore and the centre of the Deccan; **Malayalam** along the west coast; and **Kurukh** in the Central Provinces south of Chota Nagpur. Of the Andhra group by far the most important is **Telugu**, spoken by over 20,000,000 people in Madras, that is, by a larger number of persons than speaks any other of the Dravidian tongues. Tamil, Kanarese, and Malayalam are, as far as the number of persons speaking them goes, next in order.

Kandh, another of the northern group, is spoken by about half a million people on the south-east of Orissa.

**Tamil**, the language of northern Ceylon and south-eastern India, has an alphabet of its own, and is the oldest, the richest, and the most highly developed of the Dravidian tongues. It has a copious literature, and has been widely spread by coolies over India and Farther India.

**Kanarese**, the language of Mysore, has a very old literature, written in an alphabet closely connected with that in which Telugu is written.

**Telugu** is the language of northern Madras. It is the principal speech from Madras to Orissa, and is also spoken in the east of the

Nizam's dominions, and in the south of the Central Provinces Kurukh is the vernacular of a Dravidian people in Chota Nagpur. Tulu is the speech of a people dwelling in the west of Madras, in the southern part of the Kanara district. **Kandh** is the name given to the language spoken by the Khands of the Orissa Hills, and **Brahui**, a Dravidian tongue, is the language spoken by some tribes in the Central Highlands of Baluchistan.

### Munda Languages

Besides what are known as Indo-Aryan and Dravidian languages, the people of India speak another group of tongues to which it has been proposed to give the name Munda; but while Dravidian tongues are spoken by about 60,000,000 people in India, the Munda tongues are used by somewhat less than four million.

To the **Munda** languages the name **Kolarian** is sometimes given. These are the languages which have been longest spoken in India, and which may claim therefore to be aboriginal.

Their scattered existence is best explained by the supposition that they were once much more widely diffused, were indeed the languages spoken over the greater part of India, of Farther India, of Malacca, and the East Indian islands. They are **agglutinative**, and differ in this respect from the early **synthetic languages** of India or the later **analytic**. Their chief home is Chota Nagpur, and their chief language **Kherwari**, a tongue used by nearly three millions of people. People speaking Munda tongues are met with in the bordering districts of Bengal, Madras, and the Central Provinces.

### • Tibeto-Burman Languages

The peninsula of Farther India seems to have been peopled by migratory swarms from the uplands of Western China. Of these migrations three successive waves have been distinguished. There was first a very early irruption into Northern Burma and Assam, followed, at a much later though still remote period, by the second swarm, which spread over much of Burma and Tibet. Lastly there was the Shan or Tai invasion. These, driving their predecessors westward and eastward, made themselves masters of the centre of Farther India, the valley of the **Menam**. A fourth Chinese invasion, that of the **Kachins**, was arrested by the British subjugation of Upper Burma.

Successive conquerors drove their predecessors to the hills or to the sea, so that the earliest of the Indo-Chinese languages are spoken on the west coast of Burma, or among the hills of Assam to the north-east of India, or the hills of north-eastern Burma. It is to be expected that the earliest Chinese settlers would be greatly influenced in their speech by the people whom they conquered; and philologists hold that at the base of the **Khasi, Peguan**, or other very early Indo-Chinese speech there is another language closely related to the Munda languages, or aboriginal languages of India. **Burmese** is the language spoken in Upper and Lower Burma, except in the western hills, the Shan States, and the country north of Bhamo. Burmese is the mother tongue of about 8,000,000 people out of a total of between 12,000,000 and 13,000,000. From your map you will see that Burmese and kindred Indo-Chinese dialects are spoken all along the Himalayan border between Tibet and India, as well as in the north-east of India and throughout Burma.

Of the remaining vernaculars the languages described as Malay-Polynesian or Malay-Indonesian are the most important. These names are given to a group of languages exceedingly simple in form and only very slightly developed. Only in Java and among the Malays is there any literature. Malay literature goes back to the thirteenth century, and Javan records to a much earlier time.

### Summary

To generalize we may say, therefore, that there are four distinct groups of languages spoken in India. **Aryan** languages are spoken in the countries bordering India on the west, in the whole of the Indo-Gangetic plain in the north, and in the tablelands lying to the south of it, and in the northern part of the Deccan as far west as the south of Konkan; and, in addition, by nearly three-fourths of the people of Ceylon, where Sinhalese, a speech closely related to Pali, the literary language of Ceylon, Burma and Siam, is the vernacular of about three-fourths of the people.

**Dravidian** languages are spoken in the south and south-east of India, and an older form of speech, taken by some to be the aboriginal language of the peninsula, and grouped as the **Munda** or **Kolarian** languages, is current in the Chota Nagpur tablelands and elsewhere. **Indo-Chinese** languages are spoken in the north along the Himalayan border, and in the peninsula of Farther India.

## RELIGIONS

Three-fourths of the people of India are Hindus and about one-fifth are Muhammadans. Next to these, as far as numbers go, come Buddhists, Animists, Christians, Sikhs, Jains, and Parsees.

## Animists

The most primitive of Indian beliefs is the **Animistic**, which through the wider personification of the forces of nature known as Pantheism, leads in more advanced religious consciousness to a spiritual conception and explanation of the universe.

**Animism** ascribes to objects animate and inanimate and to the powers good or bad that affect man an independent and continued existence, and a soul or spirit that may, like the spirit of man, be propitiated by gifts, that may be offended, that has feelings exactly like man's own.

It is the religion chiefly of the forest tribes in the middle and south of the Deccan, and of the people who occupy the lower slopes of the Himalayas. The **Santals**, **Ghonds**, and **Bhils** who occupy the hill country that borders on the Indo-Gangetic plain are reckoned Animists. In reality Animism is the foundation of the religion and religious observances of the great bulk of the population of India. The Indian peasant everywhere, though he may be a sincere worshipper of the greater gods, falls back, when trouble comes to him, on the older deities. The greater gods appear to him to be too much busied with more important matters to give attention to his poor needs. Religious observances are a means of turning away the evil influence by which he believes he is surrounded, or of procuring some material good. For these ends he visits holy places and bathes in holy streams.

## Vedic Worship

A kind of nature worship, which was so far advanced that particular duties were assigned to particular deities, was introduced into India by the Aryans. The Vedic gods, like the gods of Homer, were departmental deities. There were three groups of these gods—a sky group, a mid-air group, and an earth group. Of the different gods the greatest were the earth-born gods, especially Agni, the god of fire and of sacrifice. Through their deification of the forces of nature around them, the early Aryans gradually rose to the notion of a Supreme God.

In the struggle between the Aryan invaders and the Dravidian people, who, before the coming of the Aryans, occupied the Indo-Gangetic plain, the caste system—a system having for its end the

preservation of race purity—was evolved. Four castes were recognized: the **Brahmana**, or priestly caste; the **Kshatriya**, or warrior caste; the **Vaisya**, or agricultural and commercial caste; and the **Sudras**, or labourers.

The last group was distinguished from the three former groups, to any of which it was inferior, and any of which it was bound to serve. The duty of the **Sudra** was to serve the "twice born", especially the Brahmins. The **Brahman**, according to the Vedic hymn, was supposed to have sprung from the mouth, the **Kshatriya** from the arms, the **Vaisya** from the thighs, and the **Sudra** from the feet of Purusha, the source of the universe.

A higher generalization, and a much more spiritual one, was reached with the conception of **Brahma** as the holy principle which gives life to nature, the universal soul. Before the human soul could be reunited to the supreme spirit from which it had emanated, and of which it was a manifestation, according to Brahmanical ideas, it had to pass through numerous material forms, rising by degrees to that state of purity which fitted it for reunion with the universal spirit, and for the **Nirvana**, the state free from need of further re-incarnation, which was the result of the reunion.

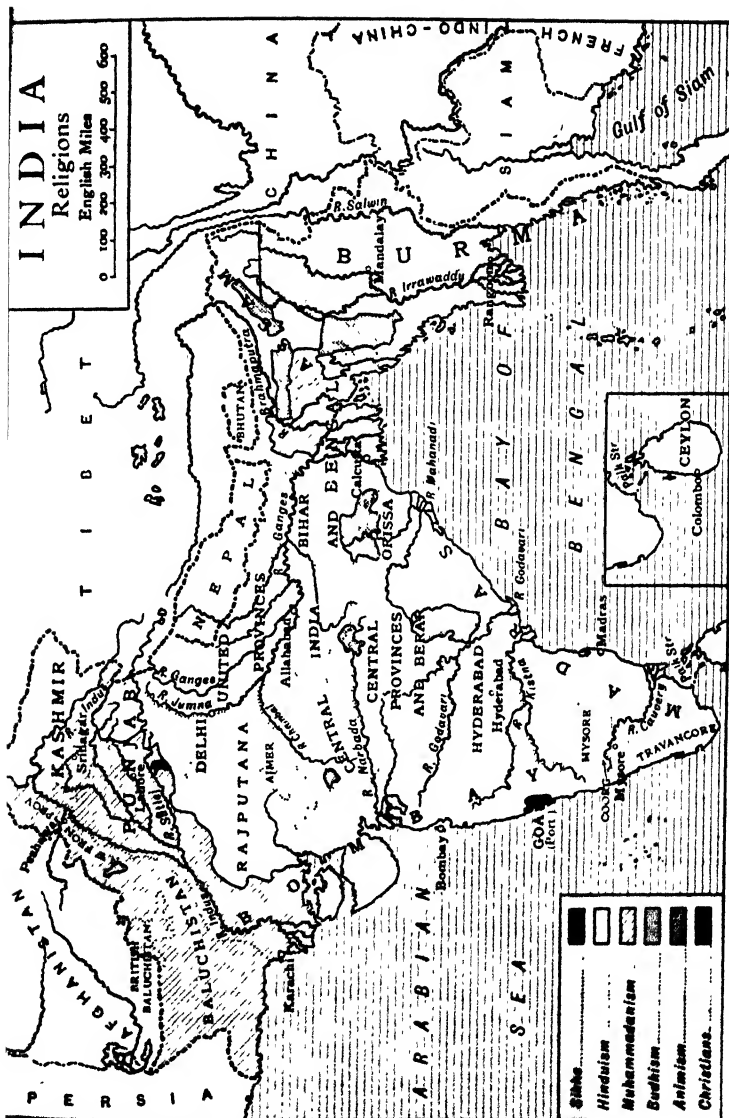
Three forms are assigned to the universal spirit in the later Brahmanical worship: **Brahma**, the creator and source of the universe; **Vishnu**, the preserver of things; and **Siva**, the destroyer. These represent undoubtedly a fully evolved and rational philosophy of existence.

### Religious Revolt

Contact with the peoples previously settled in India did undoubtedly affect the religious beliefs of the Aryans; and the worship of local and tribal deities, and the belief in witchcraft and all that is implied therein, grew greater. The **Sudras** were entirely outside the Brahmanical pale of salvation, and the **Vaisyas** existed mainly as contributors to the means of religious ceremonial.

The Aryans were broken up into clans or petty tribes each at war with some of the others. It was under such circumstances that a reform was preached by a new leader, a **Kshatriya** of the Sakya race named **Gautama**, the son of a petty prince. He became a wanderer, and by his preaching and teaching converted a great part of India to his beliefs.

Based on Hinduism, the spread of Buddhism was very rapid at first. In the third century B.C., **Asoka**, the most powerful ruler of his time, was converted to Buddhism, which during his reign spread over the whole of his vast empire. He also, we are told, sent **Bhikshus** (Buddhist begging friars) to preach his religion in every country of the world known to him. In this way Buddhism spread far beyond the confines of Hindostan.



About the same time as Gautama, the Sakyan, preached the doctrine of enlightenment, and organized on a grand scale the monastic orders which have so influenced the course of events in Tibet, in China, and in Europe, a contemporary, **Vardhamana**, who on the establishment of his order took the name of **Mahavira**, the great hero, also broke away from the Brahman creed as received, and founded a form of Hindu religion known as Jainism.

The aims of Buddhism and Jainism are much the same, and both were movements which led to the establishment of non-Brahmanical orders. They were, in fact, both of them revolts against the Brahmanic claim to exclude all save Brahmins from the ascetic and the teaching fraternities. Both are founded on the principle of self-denial. The vows of the Jain require him to hold animal life sacred, to avoid lying, to refuse to take things not given, to preserve his personal purity, and to give up all worldly attachments. Jainism is the only one of these early monastic orders that has continued on in India down to the present time.

### Hinduism

From the conflicting beliefs embodied in the Brahmanic teaching of the Aryans, and the revolt against the exclusive doctrines and teaching of the Brahmins embodied in Buddhism and Jainism, and from the struggle of all these forces with the Animistic beliefs of the peoples settled in India in pre-Aryan times, arose modern Hinduism.

The most obvious characteristics of the Hindu are that he worships numerous gods, regards the cow as a sacred animal, believes in caste, and accepts the authority of the Brahman. Brahmanism, on the other hand, to secure this partial recognition, has had to adopt some practices which originated among the aboriginal races. Many of the Hindus are practically given over to the worship of their local deities, most of whom are of the female sex.

**Siva** and **Vishnu** are the chief gods of the Hindus. From the fight with Buddhism in the centre and south of the Deccan arose the **Sanyasi** ascetics; and, later, the struggle between **Baghats** of Northern India and the **Sanyasis** gave rise to the Jogi order. Innumerable sects of Siva worshippers have sprung up in India, though his worshippers the Saivas are not so numerous as the Vaishnavas.

Two of Saivist sects are the **Smartas** of the south of the Deccan, who are followers of tradition, as their name shows,

and the **Lingayats**, who are of Mysore and the Southern Deccan.

The **Lingayats** reject infant marriage and permit widows to remarry. They were anti-Brahmanical, and it is due to their influence that **Kanarese** has been preserved.

The forms of **Vaishnavism** are numerous. It takes the believers back to the worship of the early gods, and includes among its deities national heroes whose memories as race benefactors are still held in reverence by the bulk of the people. The most important and popular of the many forms under which **Vaishnu** is worshipped are **Krishna** and **Rama**.

Of **Vaishnava** reformers the most important were **Ramanuja**, a South Indian Brahman, who lived between 1017 and 1137, and who did much to popularize the creed; **Rāmānand**, a missionary of **Vaishnavism** in Northern India; and **Kabir**, one of his disciples, whose teaching, it is said, in later times inspired the founders of **Sikhism**. He taught that all men are spiritually equal, and that differences in caste, rank, or religion are merely illusion. He forbade the use of meat and alcoholic drinks and the worship of idols.

**Sikhism** was founded in the Punjab by **Guru Nanak**. It includes belief in one God, and condemns idolatry and the worship of other deities. It abolishes caste, and with caste rejects the Brahmanical supremacy. The formula of **Sikhism** was the Unity of God and the Brotherhood of Man. It ended as a political organization, and by its stimulation of local patriotism did much to influence the course of events in India. The **Sikhs** now number over 3,000,000.

The **Saktas** are the third great Hindu sect. The origin of their creed in the fifth century A.D. seems traceable to Eastern Bengal or Assam. It appears a deification and worship of the forces of nature under different forms and names. These are known as the Divine Mothers.

Of the races that in modern times have invaded and settled in parts of India, the **Sakas** or **Scythians**, whose coins are now the sole memorial of their rule, seem to have accepted the religion and the language of the land they invaded; and, whether we conclude or do not conclude that the **Mahrattas** are the descendants of these wandering hordes and of the native **Dravidians**, we are forced to believe that their peculiar opinions were swallowed up in the ocean of Hindu beliefs.

In modern times, in the conflict of opinions that has arisen from contact with foreign beliefs, numerous modern **Vaishnava** sects have sprung up. Among these may be mentioned the **Radhaswamis**, who have no temples or priests, and who recognize the separate existence of God, the Soul, and Matter. There have, in addition, in later times



arisen numerous sects, some of them implying a social rather than a religious basis for their existence. Of these sects the **Satnamis** may be considered a fair example. This sect was founded early in the seventeenth century by an **Oudh Rajput**, and was extended by the famous teacher **Chamār Ghāsidās** among his own caste.

Modern theistic sects of a nationalistic tendency, of which the **Brahmo Samaj** in Bengal and the **Arya Samaj** in the Punjab and the United Provinces may be taken as examples, have originated in the attempts to reform Hinduism.

### Muhammadanism

As the religion of Mahomet spread eastward it came into contact with India, both through Arab traders and their settlements on the Malabar coast, and through invasions of North-western India by way of Persia and Baluchistan. These had little effect on the religion of the people.

From the invasion of India by Mahmud of Ghazni towards the close of the tenth century, up to the establishment of the Mughal power under Babar in the first half of the sixteenth, there was a constant struggle between Hinduism and Islamism. It is quite likely that forcible proselytism was but little resorted to by the Muhammadan conquerors of India; but Islamism as the religion of the rulers naturally commended itself to many of the people, and so the Muhammadans in India are next in number to the Hindus.

Muhammadans form about one-fifth of the total population of the country, and in some parts outnumber the Hindus.

The chief sects of Muhammadans are known as **Sunnis** or **Traditionalists**, who accept the **Sunnat** or collected records of usage as supplementary to the **Koran**; and the **Shiahs**, who, rejecting as usurpers the first three **Imāms**, hold that the headship of the faithful rested in **Ali** and his descendants through **Hasan** and **Husain**, the prophet's grandsons.

### Other Religions in India

Driven by the Muhammadan conquest of Persia from their native land, a small body of the believers in the doctrines taught by **Zoroaster** nearly two thousand years before sought a home in India, where they were known as the **Parsis** or **Persians**. They number at the present time about 100,000, and are almost entirely confined to **Bombay** and **Baroda**.

**Christianity** was introduced very early into India, where,

according to tradition, it was first preached by St. Thomas. As early at any rate as the fifth century a branch of the Nestorian Church, recognizing the patriarch of Babylon as its spiritual head, was in existence in India. The aim of the Portuguese missionaries after the discovery of the sea route to India was to bring these people under the control of Rome.

Hence there arose in India, under the name of Christian, the **Old Church** or Syrian Catholics, having for their head the **Patriarch of Antioch**, and using for their services the Syrian tongue; and the **New Church** or Jacobites, which recognizes the Pope as their head. The **Franciscans** established themselves in India in the beginning of the sixteenth century, and for ten years St. Francis Xavier prosecuted his missionary labours there. It was not till the beginning of the eighteenth century that the first **Protestant** mission was established, and not till the beginning of the nineteenth that the East India Company permitted the foundation of the bishopric of Calcutta, of which Bishop Middleton was the first holder. Dr. Duff, one of the pioneers of higher education in India, was the first missionary of the Church of Scotland.

Christians make over 1 per cent of the population. They number about 4,000,000, and of these nearly one-half are Roman Catholics and about one-ninth, or between four and five hundred thousand, belong to the English Church; a rather larger number are what may be described as Romo-Syrians, and the remainder belong to the other branches of the Christian Church. Two-thirds of the Christians in India are found in the Presidency of Madras and in the native States connected with Madras. Bengal and Bihar and Orissa with their enormous populations have between them only about a quarter of a million Christians, and the other provinces have even fewer.

Buddhism, which was from the time of Asoka to the end of the Gupta Era, the religion of the rulers of India, is now confined almost entirely to **Burma** and **Ceylon**, yet the Buddhists are fully more than three times as numerous as the Christians. The Jains, though they number hardly a million and a half, are found scattered throughout the whole of India. They are most numerous, however, in the Indo-Gangetic plain, and along the northern part of the Malabar coast.

## GOVERNMENT OF INDIA

After the abolition of the East India Company and the transference of the possessions in India to the direct government of the Crown, a Royal Proclamation was drawn up and sent to the Governor-General, who published it at Allahabad, where he was staying.

This proclamation, while declaring that no aggression on the dominions of the empire would be permitted, declared also that no encroachment on the dominion of others would be sanctioned, and that the rights, dignities, and honours of the native princes would be respected.

"We declare it to be our royal will and pleasure", the proclamation proceeded, "that none be in any wise favoured, none molested or disquieted by reason of their religious faith or observances, but that all shall alike enjoy the equal and impartial protection of the law."

"It is our further will", the proclamation continued, "that so far as may be, our subjects, of whatever race or creed, be freely and impartially admitted to offices in our service, the duties of which they may be qualified by their education, ability, and integrity duly to discharge."

From a government undertaken in such spirit much good was to be expected, and much good has arisen.

In Britain the administration of Indian affairs is entrusted to a **Secretary of State**, aided by a **Council** of not less than ten and not more than fourteen members. These are appointed for seven years by the Secretary of State for India, and at least nine of the fourteen must have served or lived ten years in India and not have left it more than five. The Council has control of the business in the United Kingdom relating to the government of India, and the expenditure of the Indian revenues is subject to the control of the Secretary of State for India in Council. A member of the Council cannot sit in Parliament; may, however, be removed upon an address from both Houses; and may on the completion of his seven years' service, for special reasons be reappointed by the Secretary of State.

The supreme authority in India is the **Governor-General in Council**. To this authority the title **Government of India** is usually given. The Governor-General is appointed by the political party in power in Great Britain, and he is assisted by a Council of six members and the Commander-in-chief in India, who is an extraordinary member of the Council. The six ordinary members are appointed, like the Governor-General himself, for five years, and represent the different departments of the Indian Government. There are ten Government departments, each

**INDIAN EMPIRE AND CEYLON.**

English Miles  
0 100 200 300 400 500

AFGHANISTAN  
TIBET  
CHINA  
TONG-KING  
SIAM  
CEYLON  
NIOBAR IS.  
ANDAMAN IS.  
BAY OF BENGAL  
BENGAL  
BOMBAY  
ARABIAN SEA  
CEYLON, same scale.

0 100 200 300 400 500

**CEYLON, same scale.**

with one of the secretaries to the Government of India at its head. The president of the Railway Board is, however, the head of the Railway Department, and is authorized to act as if he were a secretary to the Government.

For law-making the Council is increased by sixty-one members, making in all, with the Governor-General, sixty-eight members. Of this Council the **Lieutenant-Governor** of the province where it meets for the time being is an ex-officio member.

### Indian Local Governments

There are in India, besides the Central Council, fifteen local governments; the country being since 1912 divided into ten great and five smaller provinces. **Madras, Bombay, and Bengal** are each ruled by a **Governor** appointed by the Crown. Each has an Executive Council consisting of two members of the Indian Civil Service appointed by the Crown, and a third member, who must be a native of India. This Council the Secretary of State for India may increase to four, but two or more of the four must have been in the service of the Crown of India for at least twelve years. **Bihar and Orissa, the United Provinces, the Punjab, and Burma** are each ruled by a **Lieutenant-Governor**. The Lieutenant-Governors are appointed by the viceroy, with the approval of the Crown. Like the governors of Bengal, Madras, and Bombay, each of the lieutenant-governors has a legislative council of his own. The legislative councils vary in number, and are composed partly of officials, partly of non-officials, and partly of experts.

Each province is divided into sections under the control of commissioners, and each of these sections or **Divisions** is broken up into **Districts**, at the head of which is an administrative officer, a deputy commissioner or collector, who has complete control of the affairs of the districts, and is responsible only to the governor of the province. There are nearly three hundred of these districts in British India. Each district is about the size of an English county, and has a population of from half a million to considerably more than a million. The average area of a district is between four and five thousand square miles, and the average population about a million. The District Officer, as chief magistrate, is responsible for the maintenance of peace and order, and has control of the police of the district; as collector he is responsible for the collection of the land tax, and for the local administration of stamps, excise, and other branches of revenue.

The three Governorships and four Lieutenant-Governorships, with the Chief Commissionerships of the **Central Provinces**, of **Assam**, and of the **North-west Frontier Province**, make up the chief local governments.

**British Baluchistan**, **Coorg**, **Ajmer-Merwara**, **Delhi**, and the **Andaman and Nicobar Islands** are governments of less importance.

### **Native States**

The chiefs of the native states, of which there are over 700, varying in size from great kingdoms like Hyderabad to governments embracing only a village or two, cannot make war or peace or send ambassadors to each other, or to foreign states, and are not allowed to have an army of more than a prescribed size. No European without permission is allowed to reside at their courts, and in cases of misgovernment the Central authority exercises supreme control. It is the right and duty, also, of the government to settle successions in the Protected States. Otherwise the rulers each govern their own states, though some of them are required to pay an annual fixed tribute.

The people of the native states are looked on as foreigners legally, though in certain cases British courts wield extra-territorial powers within the states. The Foreign Department of the Government of India, or one of the provincial governments acting through political officers styled agents to the Governor-general, or residents, &c., exercises control over the native states. The rulers of these states are expected to carefully consider the advice of the **political officer**; but the officer himself is expected to avoid any unnecessary interference with the native rulers in the management of their affairs.

In India local government has of late been considerably developed. The municipal governing bodies have charge of the **roads**, the **water supply**, the **markets**, and the **sanitary arrangements**. For these purposes they levy taxes, make by-laws, and spend money on improvements sanctioned by the provincial government. In all the larger towns, and in many of the smaller, the majority of the members of the municipal council are elected by the ratepayers.

## CEYLON

Though Ceylon is geographically merely a detached portion of the Southern Peninsula, it is, politically, entirely separate from India; forms, in fact, no part of the vast Indian Empire. The control of the affairs in Ceylon is in the hands of a **Governor**, aided by an **executive council** of seven members, partly official and partly nominated by the governor, and by a legislative council of twenty-one members.

It will thus be seen that as far as government is concerned Ceylon resembles one of the provinces of the Indian Empire. The only difference is that the province is under the control of the Governor-general and of the Secretary of State for India, while Ceylon is under the control of the Secretary of State for the Colonies.

## Law

The most important government function is the maintenance of law and order, in other words the securing or safeguarding to the people governed of their life and their property. In drawing up a code of laws for the government of India, care was taken to consider the precepts of Hindu and Muhammadan laws, as well as the principles and practices of England, France, and other countries; so that the Indian **Penal Code**, in the way of being easily understood and interpreted, and in the thoroughness with which it meets the needs of modern Indian life, has scarcely a rival among the law codes of the world.

With regard to **procedure** it enables the meanest of the emperor's subjects to bring a suit against any man by whom he thinks he has been wronged, no matter how high his position.

Each of the **Presidencies** of Madras, Bombay, and Bengal has a supreme **High Court** for the settlement of affairs. From the decision of these courts, the only appeal is to the **Privy Council** in England.

The United Provinces has a similar **High Court** with a similar right of appeal, while the Punjab has a **chief court** with six judges for the revision of decisions arrived at in the inferior courts. Burma has a **chief court** as well as a judicial commissioner for Upper Burma, while the Central Provinces, Oudh, the North-west Frontier Provinces, Coorg, and Sind have **judicial commissioners**.

In India the accused has the privilege of appealing to the District Judge, and even to the High Court, from any order that may be issued to his disadvantage. The important point is

that the Government cannot on its own authority condemn any person or impose any punishment upon him. Before sentence can be passed upon him, the accused must be brought to trial in open court, and the judge must give his decision. Any punishment imposed by the Government without such open trial would at once be declared null and void.

In India there are fully 9000 officers engaged in administering the Civil and the Penal Codes. Of these nearly three-fourths are employed administering the penal laws, while fully one-fourth are engaged in exercising jurisdiction in civil affairs. In some districts of India trial by jury has been introduced.

The judge in important criminal cases often calls in the aid of assessors, who pronounce as to the guilt or innocence of the accused with regard to points of fact.

### Representation

In local matters the voice of the public has very great influence. The municipalities, the district and local boards contain a number of members not appointed by the Government but elected by the people. The local boards are wholly elected.

Two-thirds of the commissioners of the municipalities are elected, and even the district boards have a number of elected members. The electors in India are possessed of a property qualification; otherwise the system introduced is a form of pure popular election. The local boards in turn choose members for the Provincial Councils and select members for the supreme Legislative Council.

### Education

India had, for ages her own system of education, her village schools for teaching reading and writing and arithmetic in the native tongue, and her High Schools for teaching Persian or Sanskrit, and the professional subjects by which the scholars afterwards earned their living. These were almost entirely voluntary; and it was only after the assumption of the Government of India by Great Britain that it began to be looked on as a duty of the Government to impart an education to all the people.

The old High Schools were open only to the superior castes of Hindus, and the Madrasahs were open to Mussulmans only; but the Government of India educates all classes without regard for caste or creed.



There are five universities, those of **Madras, Calcutta, Bombay, Allahabad, and the Punjab**. These are merely examining bodies, but they have under their control numerous affiliated colleges. The universities, since the Curzon Commission, have become more residential, and the teachers have got more control over their senates.

There are in India between 170,000 and 180,000 educational institutions, attended by between 6,000,000 and 7,000,000 pupils. Nearly three-fourths of these, attended by almost two-thirds of the pupils, are public institutions. There are close on 200 colleges, attended by over 20,000 students, while the High Schools number over 6000 and are attended by nearly 1,000,000 pupils. The 200 Training Schools for teachers and other Special schools are attended by only about 150,000 students.

Of the educational institutions in India over 30,000 are public, over 80,000 are in receipt of State help, and about 60,000 are unaided.

There is still, however, much to do in the way of educational improvement. In India, less than 30 per cent of the boys, and less than 5 per cent of the girls, of school age are at present in attendance at school.

Both Primary and Secondary Schools in India are inspected by Government officials appointed for that purpose. The Primary Schools teach reading, writing, and arithmetic only, and in the highest classes they teach also the simplest rudiments of Science and Art.

It is the business of the Secondary Schools to prepare the student for the matriculation or university entrance examination. Besides affording the opportunity for general culture, the college which the student enters on leaving the Secondary School prepares men for the beginning of life, supplies them with a professional, technical, scientific, or artistic education according to their needs. There are in the universities Faculties of Law, of Medicine, and of Engineering, in one or other of which the student may graduate.

Besides, there are eight art schools, provided by the Government, in which drawing, painting, architecture, and other arts are taught. To promote the higher education of the people, and to encourage their wish to extend the bounds of human knowledge, Government has established a number of Post-Graduate or Research Scholarships.

In 1910 a separate **Education Department** of the Government of

India was formed, and a sixth member was added to the Governor-general's Executive Council. The new department has under its charge, in addition to educational matters, questions connected with local self-government, sanitation, and some other kinds of administrative business. From the reports issued it is manifest that very great educational advances have been made in recent years. There has been a great increase in the numbers of pupils attending the different kinds of educational institutions. The grants for education, too, have been much increased, and the character of the education given has been greatly improved. The control of education is chiefly in the hands of the Education Departments maintained by each local Government. These departments provide inspectors and supply professors and teachers for the Government Schools and Colleges. The Indian Education Service draws its supply of teachers and professors from the Universities of the United Kingdom, while the Provincial and Subordinate services draw their staff from India. Recently a great impetus has been given to technical education by the institution of state technical scholarships, to be held in the United Kingdom, and by the establishment of technical, commercial, and industrial schools in various parts. Among the important technical educational institutions are the Indian Institute of Science at Bangalore, the College of Science at Poona, the Victoria Jubilee Technical Institute at Bombay, the Serampore Weaving Institute in Bengal, the School of Arts and Crafts at Lucknow, the Technological Institute at Cawnpore, the Madras College of Engineering, and the Silipur Engineering College, Calcutta.

## DISTRICTS

In India, from very early times, the village community has been the administrative unit. Each village in the East, as in the West, was a little republic. It was surrounded by some sort of enclosure wall, ditch, or fence, and the headman of the village collected the revenue at which it was assessed, and sent it to the king. The village was in all essentials a small self-sufficing republic. Ten or more of these communities were placed under an official, whose title showed how many villages he had under his charge. Over ten or more of these village groups a superior officer was placed.

In an empire so vast as India it was found essential that the administrative unit should not be confined to so small an area as the village, and the district was adopted as the unit.

Each district is under an officer, a Collector, who, as the name indicates, gathers the revenue. He is also responsible for the peace of the district, and, as principal executive officer, has control of all the district affairs. There are a great many officers under him, including,

of course, the District Police Superintendent, District Medical Officer, District Engineer, the Deputy Inspector of Schools, and a number of experienced Deputy Magistrates.

These districts have varied little since Muhammadan, or even since early Hindu times. There are in all somewhere between 260 and 270 of them. They are not, as might be expected, formed by rule according to area and population combined. Each district is usually of such as one man, taking everything into account, can be expected to supervise.

A number of districts are combined to form a division, which is under the control of a **Commissioner**; and a number of divisions are combined to form a province, which is under the control of a Chief Commissioner, a Lieutenant-Governor, or a Governor. In Madras, however, there are no Commissioners. In that Presidency the Government Secretaries and the Board of Revenue control the district officers.

## COMMERCE

An examination of a map of the world will show why the trade of India has always been mainly with countries lying to the west. More than seven centuries before the Christian Era a trade sprang up between the Persian Gulf and India. It is said that this Persian Gulf trade was extended even to China. By this route the rice, sandalwood, and peacocks of India were carried into the Persian dominions, and probably even beyond them to far-off Europe. At the beginning of the Christian Era, we learn that Europeans drew from India spices, perfumes, precious stones, silk, and muslin and other cotton goods; and that they exported in return gold, silver, copper, tin, lead, and cloth. India, according to a Roman writer of the period, drew from Europe annually nearly half a million sterling's worth of gold and silver.

After the overthrow of the Roman Empire by the **barbarians**—the **Goths** and **Vandals** and other savage Germanic tribes, and the **Huns**—and the conquest of Persia by the **Arabs**, the trade between India and the west seems to have become very much smaller. In the west, however, there was still a great demand for the spices, the rich silks, the ivory and precious stones of the East, and this was partly satisfied by the establishment of a land route through Persia and Syria to the west. By this route, and by the Red Sea and Egypt, the whole trade between India and the west was carried on, till the irruption of the Turks into south-western Asia and north-eastern Africa and their capture of

Constantinople and overthrow of the Greek Empire put a stop to it for a time.

The **Portuguese**, who made their way round the Continent of Africa, restored to some extent the trade with the East; and when Portugal was subdued by Spain, the trade with India was thrown open to that country and its dominions. As subjects of Spain the **Dutch** came to India. When they revolted and established the United Provinces, the Dutch still continued to carry on the trade with India, and the centre of the trade with the East was for a time Amsterdam.

To get rid of the burdensome monopoly in pepper and spices which the Dutch had established, the English East India Company was founded in A.D. 1600. Their trade was at first mainly with the East Indian Islands, and it was not till 1608 that they established their first factory at **Surat** on the west near the mouth of the Tapti. Gradually the British made good their footing in India. Factories were established on the east coast at Fort St. David, and on the Ganges at Fort William.

During the struggle with France in the middle of the eighteenth century the British, who had up to that time been merely traders, were forced to accept the government of various districts; but up to almost the middle of the nineteenth century the trade between India and Western Europe was of comparatively small bulk, and consisted mainly in the export of silk, spices, indigo, calicoes, and sugar, and the import from Britain of cotton yarn and piece goods, of metal goods, salt, and bullion.

Since the middle of last century the trade of India has not only increased enormously, but has almost entirely changed its character. While ships carrying their cargoes to Europe had to sail round Africa, the only freights from India that were worth paying for, were those of goods combining great value and small bulk. The making of the Suez Canal has changed this state of things; and now, of the exports from India, raw materials form the bulk.

### Exports

The chief articles of export are: **raw cotton, seeds, rice, raw jute and jute manufactures, wheat, tea, opium, raw hides and skins, cotton yarn and cotton manufactures, raw wool, coffee, oils, dyeing and tanning materials, and lac of all sorts.** Of Indian exports, Great Britain takes

about one-sixth. The total sea-borne trade of India is in round numbers about £300,000,000 sterling, the exports alone being roughly of the value of over £160,000,000 sterling. Of Indian exports Great Britain takes £40,000,000 sterling, and the British colonies and dependencies take in round numbers £30,000,000. After Great Britain, up till 1914, the largest purchaser of Indian goods was Germany, which was credited in 1910-11 with 10 per cent of the total. In that year the United States of America and Japan each took nearly 7 per cent of the Indian goods exported.

Of the grains exported from India rice and wheat are the most important. Indian rice is exported to all the tropical countries of the world, to every region, in fact, to which the Indian or Chinese coolie penetrates. Of the wheat exported from India, most of which is grown in the Punjab, the larger proportion is intended for British consumption. Of late years **Karachi**, as might be expected from its situation, has become the great Indian-wheat port.

**Oil seeds**, which, next to raw cotton and the food grains, are the chief articles of export from India, are mainly sent to Europe to be used in the soap and candle works.

Of Indian raw cotton, which labours under the disadvantage of being very short in the fibre, Japan is the principal foreign consumer.

Jute is in great demand in Europe for the manufacture of packing-cloths, bags, and ropes, and the export of jute to Dundee and other manufacturing towns in Europe is important.

The establishment of jute mills in Calcutta and its neighbourhood has enabled India not only to supply her own demand for gunny cloth, but to export larger and larger quantities of the manufactured article. Of manufactured articles exported from India jute is now the chief. The value of manufactured jute exported is nearly twice as great as that of the cotton yarn and cotton cloth exported. From 1901 to 1910 the export of jute from India more than doubled.

India now supplies the greater part of the **tea** consumed in Great Britain; indeed, if we include with India Ceylon, it supplies all but a very small fraction. The values of the tea, exported chiefly to Europe, and of the opium, which is exported mainly to China, are almost equal.

India, as has been pointed out, is largely an agricultural country, and imports much of the manufactured stuffs it uses. Formerly the hand-made products of Indian looms, and the fine metal-work of Indian gold- and silversmiths, were in great demand both in India and in Europe; but the improvements in machinery and in methods of production generally have

enabled the factory products of the west not merely to supply their own wants, but in most cases to take the place in India of the home- and hand-made articles.

### Imports

Though India is becoming year by year more of a manufacturing country, at present she imports a large quantity of manufactured articles.

**Cotton goods** are the principal article of import, the value of the cotton goods being fully one-third of the total value of the imports. India still continues to produce in her hand-loom and in her factories some of the finer cottons and muslins for the production of which she was once so noted. To make these she finds it necessary to import yarn of a much higher count than can be made from the cotton at present grown in India.

Of sugar, which at one time was one of the leading articles of export from India, the country now imports about £10,000,000 sterling worth annually.

Woollen goods, which were at one time the chief article of import from Europe, have now fallen into a very unimportant place, their value being only about 7 per cent of the value of the cotton imported; but India imports largely from the west iron and steel goods, railway material, and machinery for her mills, &c.

At present India imports also large quantities of mineral oil, though the wells of Burma and Assam are now producing large quantities.

Among the important classes of articles bought by India may be mentioned hardware, apparel, and silk goods.

Of the articles imported by sea into India, amounting in value to between 130 and 140 millions sterling, no less than 63 per cent are got from Great Britain. In 1912 goods of about one-tenth of the value got from Great Britain were got from Germany, and goods of about one-twentieth of the British value from the United States. The total trade of the Indian Empire and Ceylon may be taken to amount in round numbers to 320 millions sterling. Of that amount about 180 millions are credited to exports and 140 millions to imports.

### Harbours of India

The Deccan in stretching southward into the India Ocean, and in separating the Bay of Bengal from the Arabian Sea, supplies India with a great extent of coast line, including, as

must be remembered, both sides of the Bay of Bengal. But the coast line of India, owing to the long period during which the earth block that forms the Deccan has been above the waters, and almost unchanged, has comparatively few harbours, few at least that can accommodate the huge vessels now employed in international commerce.

A similar lack of harbour accommodation will be found to mark the coast of Africa, Western Australia, and what are by some thought to be other fragments of the supposed ancient equatorial continent, **Gondwana Land**. From the coast of **Makran**, on the borders of Persia, to Cape Comorin, during the prevalence of the South-west Monsoon, navigation becomes almost impossible along the rock-bound coast of Western India, and the trade of the coast is confined nearly entirely to **Bombay** and **Karachi**. On the eastern coast of the Deccan, the absence of good harbours is even more manifest. South of the mouth of the Ganges there is, on the eastern side of India, nothing better than an open roadstead, to which no steamer drawing more than fifteen or twenty feet of water can approach within miles.

Even the harbour of **Madras**, on which great sums of money have been spent, and where an effort has been made, by the construction of sea-walls, to convert the roadstead into a harbour, can only be considered a very partial success; though where there was formerly only an open roadstead steamers can now lie in comparative safety, and P. & O. and several other passenger-line steamers now call at the port.

The eastern coast of the Bay of Bengal differs in this respect from the western. Formed by a dependent loop from the eastern end of the Himalayan system, it is of comparatively recent origin and contains numerous excellent harbours. Among these may be mentioned **Moulmein**, **Rangoon**, **Bassein**, **Akyab**, and **Chittagong**, all of which are accessible by steamers of large draught.

### Great Ports

The comparatively small number of ports to which the foreign trade of India is confined may be judged from the fact that nearly two-fifths of the imports and of the exports pass through **Calcutta**; over one-third of each through **Bombay**; about 10 per cent of each through **Karachi**; 9 per cent through **Rangoon**; 7 per cent of imports and 3 per cent of exports through **Madras**; and less than 1 per cent of imports and a little more than 2 per cent of exports through **Tuticorin** and **Chittagong** respectively.

About 80 per cent of the vessels that enter and leave Indian ports fly the British flag, and nearly 99 per cent of the entire sea-borne trade of

India is carried in steamships; the nearly two thousand native craft, Arab and other, being for the most part sailing ships, and so small that they account for little more than 1 per cent of the total tonnage.

The great ports of India, the ports by which its trade with foreign countries is almost entirely conducted, are four in number: **Calcutta, Bombay, Karachi, and Rangoon.** The chief port of Ceylon is **Colombo**, the capital, which has been converted, by the construction of breakwaters, from an open roadstead into one of the world's great seaports, and one of the main ports of call on the routes between Europe and eastern Asia, and Europe and Australia. The great artificial harbour at Colombo, which has been made at a cost of over £3,000,000 sterling, has added enormously to the importance of Colombo.

### Port and Harbour Trusts

**Port and Harbour Trusts**, for the management by locally interested and locally selected bodies of the affairs of the ports, have been created in the case of Calcutta, Bombay, Karachi, Madras, Rangoon, Chittagong, and Aden.

The members of these Trusts are as a rule selected by the Chambers of Commerce and similar bodies, and consist for the most part of members representing the commercial people interested in the port. They administer the affairs of the port, and see that suitable dock and other accommodation is provided, and fix the port dues and the fees charged by the port officials for the various services rendered. Each Trust has for chairman an officer appointed by the Government.

The importance of these bodies and of the work they do may be judged from the fact that the income of the Calcutta Harbour Trust alone amounts to over half a million annually, or over 80 lakhs.

### INDIAN ROADS

Roads are made primarily to enable the surplus produce of one part of a country to be exchanged for the surplus produce of another part, at least that is the chief modern reason for making roads. In earlier times, military considerations had more to do with road-making than they have at present. Still, it must be remembered that the roads and railways in most countries are made with due consideration of their military uses, and in some cases their usefulness for offensive or defensive purposes is the chief consideration in making them.



The great road builders of the Old World in Europe, the Romans, fixed the direction and character of their roads mainly by military considerations; and their carefully-built roads, more than two thousand years old, form, even now, the basis of many of the road systems of western Europe. The directness with which these roads go from point to point, regardless of obstacles, shows that they were made when the transfer of goods by roads was almost entirely the work of pack animals. Then there was little need for the careful study of gradients which the use of wheeled vehicles has made essential.

### History

Roads in India can hardly be said to have existed before the nineteenth century. Established routes there were through almost every part of the country, marked by brick pillars and guarded by posts; but they were entirely unsuited for vehicles, and the traffic on them was carried on almost entirely by means of pack animals. Sometimes these routes were shaded with trees as well, and watchmen were provided to guard them. The chiefs through whose land the routes ran had the right to levy a small toll for their maintenance, and for the expense of the watchmen, or **chaukidárs**, who guarded them; and the magistrates of the districts through which the roads ran were responsible for goods stolen within their jurisdiction.

Of the old protected routes, one of the most important was the **Great Deccan Road**, which ran from **Mirzapur** on the Ganges near Benares southwards by **Jubbulpore** and **Nagpur** through the Deccan. There were other routes both in the Indo-Gangetic plain and in the southern plateau which the Mughal emperors marked out and caused to be guarded as they were largely used by caravans.

The direction of roads, as of railways, is partially determined by the surface features of the country through which they pass, and the character of the roads is fixed by the suitability of the material used in their structure, and the ease with which that material can be obtained.

### Kinds of Roads

In the Indo-Gangetic plain, which is almost perfectly level, roads can be made with almost equal ease over any part. There the difficulty in building roads is found to lie in the insufficient supply of suitable material for their structure and maintenance. Most roads in the Indo-Gangetic plain are metalled with broken brick or with **kankar**. This is due to the absence of stone or gravel over large areas.

In India, it must be remembered, the primary duty of the local boards is the upkeep and betterment of the means of communication in the district. Most provinces of British India have now **district and local boards**, whose duty it is to use the funds at their disposal for the improvement of the means of local communication.

Roads are costly to make in the Indo-Gangetic plain on account of drainage difficulties, and on account of the absence of stone or gravel suitable for their structure. In Bombay and in Madras they cost a great deal to make, on account of the uneven character of the surface. Notwithstanding these difficulties, since the middle of the nineteenth century there has been an enormous extension of the means of communication by road throughout British India. We may consider Indian main roads as consisting of two kinds:

(a) The metalled roads, with bridges or ferries and drains throughout, and mostly with avenues of trees planted along them to secure shade for the travellers.

(b) The unmetalled roads, banked and surfaced, and having bridges, ferries, and drains throughout.

### Recent Progress in Road-making

Besides these, there are various other kinds of what may be called roads, all of which serve as means of communication and are kept up at the public expense. Though India, considering the vastness of the country, cannot be said even now to be well supplied with roads, some idea of how much has been done in the last century may be formed from the fact that of the first class of roads, the metalled, there are in India now between 40,000 and 50,000 miles; while of the second class of roads, there are well over 150,000 miles.

On new works and on repairs of the roads, &c., the expenditure in 1911-2 was over one million sterling. The building of roads and railways has completely changed the method of carrying goods in India. Wheeled vehicles have throughout almost the whole of the country taken the place of the old pack animals. In several parts of India, also, the well-built roads which have come into existence have been utilized for light railways or for tramways.

### RAILWAYS

Though the railway system of India extends now to between 30,000 and 40,000 miles, the country cannot be said to be adequately supplied. Europe, which is little more than twice

the size, and the population of which is only about one-third greater, has over 200,000 miles of railway; while the United States of America, which is less than twice the size of India, and has less than one-third of the population, has fully seven times the railway mileage of India.

✓ The need for railways, as for roads and other means of communication, depends chiefly on the populousness of the country in which they are built, especially in an old country. Railways, of course, may also be the means of developing a country by enabling it to turn to better account its natural resources. In India railways have been the means of putting an end to the district famines occasioned at intervals by the failure of the monsoon, or rather by the shortage of production due to such failure or partial failure. The failures still occur of course; the monsoons are still occasionally delayed; but the ability to supply the wants of the district occasioned by such failures, enables the government to mitigate greatly, or altogether to prevent the sufferings they would otherwise cause.

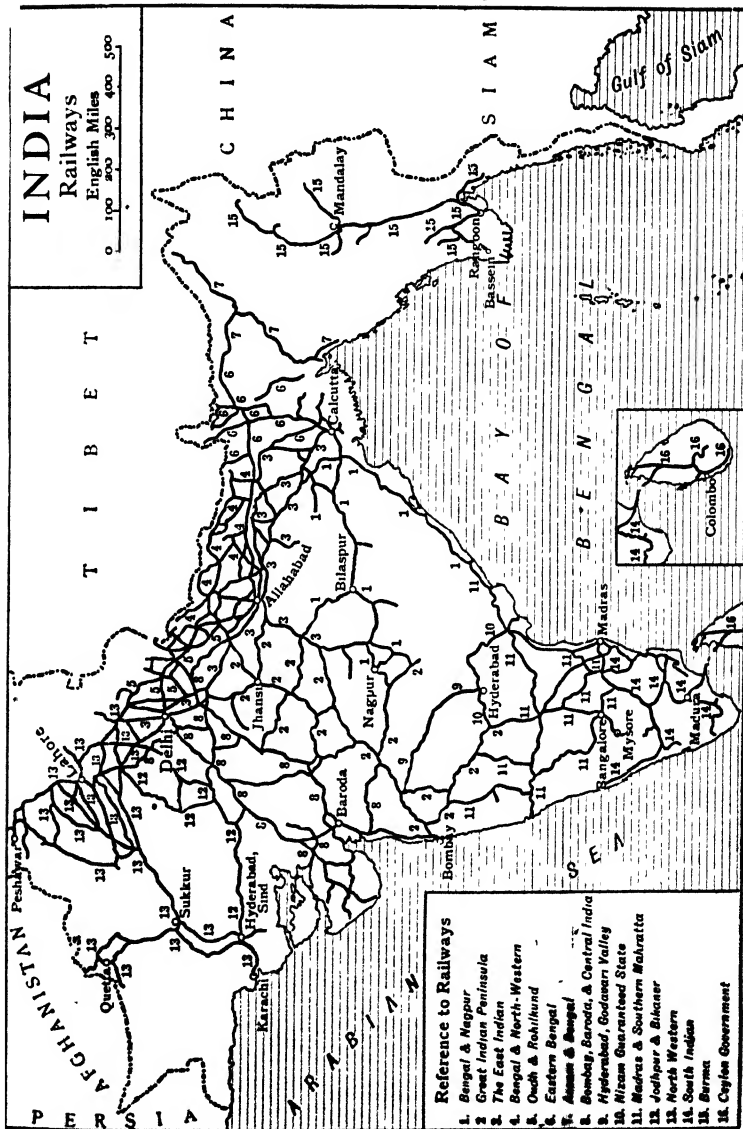
### Indo-Gangetic Plain—Western Hill Region

We would expect that the need for railways for the carriage of goods and passengers from one part to another would be greatest in the most populous parts. Roughly, fully half the population of the Indian Empire live in the Indo-Gangetic plain, and there, as might be expected, the railway lines are most numerous.

From a comparison of the orographical map of India with the railway map, it will be clear that the orographical features of the country have had a good deal to do with determining the direction of the main railway routes. Where there are tunnels to be made through hills, or bridges to be built over rivers, the cost of building the railway is much increased, and where the gradient is steep the cost of working the railway is great.

An examination of the railway map of India will show that these considerations have weighed heavily with the railway makers of India. It will show further that while railway lines run along both sides of the Ganges at no great distance from the river, which is throughout its course one of the world's great commercial waterways, they are much more numerous on the north side of the river than on the south.

The railway system of the north-west or Indus valley has been developed partly for commercial and partly for military purposes. It connects with the Ganges valley systems at Delhi, and has numerous branches in the Doabs of the Punjab.



The system extends from **Lahore** by **Rawalpindi** to **Peshawar**, or rather **Jamrud**, with a branch from **Nowshera** to **Dargai**, and a branch along the left bank of the Indus to **Dera Ghazi Khan**, from which there are branches to **Thal** and **Banu** in the North-west Frontier Province. Another branch of the system proceeds from **Delhi**, by **Bhatinda** and **Bahawalpur**, along the left bank of the Sutlej through **Samasata** and **Khanpur**, and along the left bank of the Indus to **Sukkur**, where one branch crosses to **Ruk** on the right bank.

From **Ruk**, while the main line is continued south to **Karachi**, a branch runs to the north-west through the Bolan Pass by **Quetta** to **Chaman** and **Nushki** on the Afghan frontier. The branch of the railway on the left bank of the Indus, after passing through **Hyderabad**, crosses the Indus, and uniting at **Kotri** with the branch on the left bank, proceeds to **Karachi**. At **Hyderabad** it connects with the northern systems by lines through **Rajputana**, and with the Central Indian system by a line through **Ajmer**.

### Central India and North-western Deccan

South of the **Vindhya**s a line crosses the peninsula from **Calcutta** by **Nagpur** to **Bombay**, with a section along the **Tapti** valley to **Surat**. This line has several branches towards the north by which it is joined to the railway systems of the **Ganges** and **Indus** valleys.

From **Bombay** an important line runs north and then north-east, passing by **Surat**, **Baroda**, **Godhra**, **Ratlam**, and **Ajmer** to **Delhi**. This line connects on the west with lines through **Rajputana** and **Kathiawar**, and with the railway system of the **Indus** valley.

From **Bhusawal**, a little north-east of where the **Tapti** valley section diverges from the main line, a second line passes north-east by **Khandwa**, **Itarsi**, and **Jubbulpore** to **Allahabad**, with a section from **Itarsi** by **Bhopal** and **Jhansi** to **Cawnpore**.

The line from **Bhusawal** lies for a part of its course in the **Narbada** valley, and crosses at **Katni** an east-and-west line from **Bilaspur** to **Kotah**.

At **Khargpur** or **Kharakpur**, to the west of **Calcutta**, a line runs north-west and joins the **East Indian** railway at **Gomoh**. Another line runs south-west through **Orissa** and by **Vizianagram** to **Bezwada**, near the mouth of the **Kistna**. This line crosses the **Godavari** near **Kovvar**, at the head of the delta. From **Calcutta** a line runs north-west to **Mokameh** on the

Ganges, and thence along the south of the Ganges to **Benares**. Other lines running north and north-east connect Calcutta and the east- and west-running railway system with the systems of Bengal and of Assam.

### The Deccan

South of the central line, a branch from **Kalyan**, north-east of Bombay, runs south-east by Poona and Dhond, and through the valley of the Kistna by Hotgi, Wadi, and Raichur. Then it goes by **Guntakal Junction**, Cuddapah, and Renigunta to Arkonam, where it turns east to Madras. At **Wadi** a branch from this line runs first east by north through Hyderabad to Warangal, and then south-east to Bezwada. From **Bezwada** a line passes almost east and west through **Guntakal** and Bellary to Portuguese Goa. Another runs almost due south through **Gudur** to Madras.

An important line runs across the peninsula south of Madras. It runs first west by south from Madras, then turning south by west, it runs by **Coimbatore** through the **Palghat Gap** to near the west coast. There it turns nearly north-west and passes through **Calicut** and **Tellicherry** to **Mangalore**.

A branch of this line from **Jalarpet Junction** runs first north-west and then west to Bangalore, and is connected by railway on the south-west with **Seringapatam** and **Mysore**, on the north-west with **Goa**, **Poona**, and **Bombay**, and on the north with **Guntakal**. Branch lines join up the South Indian Railway (the railway from Madras to Mangalore) with all the parts of India to the south-east, and join it also with Ceylon.

Ceylon has already a railway running north and south, the southern part of it, the part between Galle and Colombo, being close to the coast, and the northern part nearer the west coast of the island than the east.

A line from west to east connects Colombo with Kandy and with other places in the interior. Towards the end of 1902, by the opening of the Madura-Mandapam line, the South Indian Railway was carried to the farthest point on the mainland. It has since been extended to Dhanishkodi, the most southern point of the Island of Rameswaram. Here the line is connected

by a ferry with **Mannar**, to which the Ceylon Government has extended its railway. A steel viaduct with a rolling lift bridge over the Pamban channel has been provided, so that the railway connection between India and Ceylon is now complete. The possibility of replacing the ferry by a bridge has been discussed.

### North-east Border Region

In the north-east of India the railway system of Assam is far from being completed. It starts from Chittagong and runs in a general north-eastern direction to the bend of the Brahmaputra, where the river turns to the south-west. From **Kulaura** there is a branch line to **Sylhet**, and from **Lumding** another branch line to **Gauhati**. The Assam and Bengal line has been linked up with the rest of the Indian railways by a section of the Eastern Bengal railway. This new section runs from **Dhubri** to **Amingaon** opposite **Gauhati**.

The Burmese railways are, as one would expect, quite separate from the other Indian railways. To some extent they are supplementary to the Burmese waterways. The Burma railway joins up the ports of **Bassein**, **Rangoon**, and **Moulmein**. From Bassein the railway runs north-east to **Letpadan**, where, after crossing the Irawadi, it meets the main line from Rangoon to **Prome**. A line from Rangoon runs north-north-east to **Pegu**, and from Pegu, after crossing the Sittang river, farther to the north-east, the line turns south-east to Moulmein at the mouth of the Salween.

The main Burma line runs almost due north from **Pegu** to **Mandalay**, on the left bank of the Irawadi. The first part of its course is in the basin of the Sittang. At **Thazi** a western branch leads to **Myingyan**, and an eastern to Yawng-hwe. Still continuing north, the line reaches Mandalay, the capital of Burma. From Mandalay two short branches run, one north to Madaya, and the other south-west to the Amarapura shore of the Irawadi opposite Sagaing. From Mandalay a line runs north-east to Lashio, the administrative centre of the northern Shan States. From Sagaing there are two important lines, and a short line to Monywa on the Chindwin River, and a much longer and more important line to Myitkyina, the present terminus.

From what has been said, it must be manifest that the natural features of India have had an important part in determin-

ing the position and direction of the main lines, and that the other elements that determine the existence of a line are the populousness of the districts through which it passes, and its commercial capabilities, that is, the amount of the surplus products, raw materials or manufactured goods, which it can offer in exchange for goods from other parts.

## SEAPORTS AND RAILWAYS

Indian seaports are few in number. Taken in order of their importance they are **Calcutta, Bombay, Karachi, Madras, Rangoon, Chittagong**, and, in Ceylon, **Colombo**.

Each of these seaports may be regarded as the terminus of one or more railway systems by which India sends to it its material for export, and from which the imports from foreign countries are distributed throughout the Empire. **Calcutta**, the most important port, is also the chief railway centre.

### Calcutta

From **Calcutta** the **Bengal and Nagpur** railway runs west by south to Khargpur, where it divides into three, one running north-west to meet the East Indian railway in the Jheria and Raniganj coalfields, another running almost due west to Nagpur, where it meets the **Great Indian Peninsula** railway, with which it forms the east-to-west connection between Calcutta and Bombay.

Branches from Bilaspur and Nagpur, joining the Bengal and Nagpur railway to other branches of the Great Indian Peninsula railway, connect this line with the lines of Rajputana, and the Indus and Ganges valleys.

The third branch of the Bengal and Nagpur line runs south-west to Vizagapatam, and connects with the Madras and Southern-Mahratta railway to Madras.

The **East Indian** railway runs north from Calcutta to where the Ganges turns southward, then it turns west along the southern bank of the Ganges to **Moghal Sarai**, where it is joined by the Grand Chord Line from Sitarampur, which passes through Gaya. Another branch of the East Indian railway from **Khana** joins the main line at Luckeesarai. The East Indian



railway is continued from Benares south of the Ganges to Allahabad, where it sends one branch to the south-west to join the Great Indian Peninsula railway at Katni and another branch through the Doab by Cawnpore to Agra.

At Agra it is joined by the Agra-Delhi section of the Great Indian Peninsula railway to Delhi. From Agra a section of the East India railway runs to Meerut, and is continued by the north-western railway to Saharanpur, and in connection with the East Indian railway the Delhi, Ambala, and Kalka railway runs by Ambala to Simla.

The East Indian railway, it is clear then, is the main east-and-west-running line in the valley of the Ganges and to the south of that river.

It connects at Monghyr with the **Bengal and North-western railway system**, which meets the wants of most of the country north of the Ganges between the Kosi and the Gogra. At Benares, at Allahabad, and at Cawnpore it is met by branches of the **Oudh and Rohilkhand railway**, which, with the Bengal and North-western railway, supplies the wants of most of the United Provinces.

The **Eastern Bengal railway**, the last of the important systems that end in Calcutta, sends one section north through Murshidabad. This section is continued through Katihar, where it connects with the Bengal and North-Western railway, which is itself carried to the Nepal frontier. Another section from Ranaghat runs first north-east and then north to Darjeeling.

A section of the Eastern Bengal railway connects with Dacca, and through Dacca with the **Assam and Bengal railway**; and another section farther north, from Dhubri to Gauhati, also connects the Eastern Bengal system with the Assam and Bengal railway, which has for its seaport **Chittagong**.

### Bombay

Two great railway systems, the **Great Indian Peninsula railway** and the **Bombay, Baroda, and Central India railway** terminate in Bombay, and connect that great seaport with all other parts of India. The Great Indian Peninsula railway goes first north from Bombay to Thana, and then east to Kalyan. Soon after leaving Bombay the Western Ghats have to be got over. For this purpose two lines are employed. The line which goes south-east to Poona climbs the **Borghat**, and that which goes north-east to Bhusawal climbs the **Thalgat**.

The latter, which is the main section of the Great Indian Peninsula railway, is joined at Jalgaon by the Tapti Valley section of the Bombay, Baroda, and Central India railway, and at Bhusawal the Nagpur section, which joins the Great Indian Peninsula to the Bengal and Nagpur system, leaves the main line. The latter is continued through Itarsi to Jubbulpore, where it joins the East Indian railway. From Itarsi a section of the line runs north-west to Bhopal and then north by Bina and Jhansi. At Jhansi three sections are given off—an eastern, which joins the East Indian railway at Manikpur, south of Allahabad; a north-eastern, which joins the East Indian railway at Cawnpore, and a north-western, which goes by Agra to Delhi, joining at Muttra with the Bombay, Baroda, and Central India railway.

At Manmad, between Kalyan and Bhusawal, the north-eastern and the south-eastern sections of the Great Indian Peninsula are joined by a line between Dhond on the latter and Manmad on the former. At Manmad also, the **Hyderabad Godavari Valley railway** joins the Great Indian Peninsula, bringing the capital of the Nizam's Dominions into connection with Bombay and with Calcutta.

The south-eastern section of the **Great Indian Peninsula railway** is joined at Poona by a metre-gauge section of the Madras and southern Mahratta railway, and at Hotgi by another. At Wadi it is joined by the Nizam's Guaranteed State railway, which runs east through Hyderabad and Warangal to Bezvada on the Madras and Southern Mahratta railway, and at Raichur the south-eastern section of the Great Indian Peninsula connects with the Madras and Southern Mahratta, and so joins Madras to Bombay.

The **Bombay, Baroda, and Central India railway** runs north from Bombay through Surat, Baroda, and Godhra, then first east, then north, and then north-east through Rutlam, Ajmer, and Rewari to Delhi, with an eastern-going branch through Jaipur and Bharatpur to Agra.

At Surat the Tapti Valley section runs east to the Great Indian Peninsula railway at Jalgaon. At Baroda a branch runs north-west through Ahmadabad to Kharaghoda, the salt town on the Rann of Cutch, and from Godhra a branch to the south-west, which crosses the Ahmadabad branch, runs to Cambay. At Rutlam the Bombay, Baroda, and Central India railway is joined by a branch which runs north to Ajmer, and from which at Chitor a branch runs south-west to Udaipur, and by a branch from Khandwa through Indore, which connects it on the south-west with the Great Indian Peninsula railway, with which it is also connected at Nagda by another section from Jhansi through Bhopal and Ujjain.

A section of the system which runs south-west from Delhi through Ajmer and Marwar Junction to Kathiawar is connected up by way of Luni Junction with the Jodhpur and Bikaner railway, which is joined up with the North-Western railway system at Bhatinda on the north and at Kotri, near Karachi, on the south.

Another east-and-west branch of the Great Indian Peninsula, running from Katni through Bina to Kotah, joins the Bombay and Baroda system with the Bengal and Nagpur and with the East Indian railway system.

### Karachi

**Karachi**, the seaport next in importance to Calcutta and Bombay, is the terminus of the North-Western railway system, the system which supplies Sind, Baluchistan, the North-west Frontier Province, the Punjab, and part of Kashmir, and which has a greater length of track than any of the other railway systems of India.

From Karachi it runs north-east in a curve to Kotri on the Indus. Here one branch crosses the Indus, and at Hyderabad is joined by the Jodhpur and Bikaner railway. The Jodhpur and Bikaner railway, which supplies the means of communication to the western part of Rajputana, joins the North-Western system also at its upper end at Bhatinda in the Punjab. At Hyderabad a branch runs south to Badin, while the main line is continued north to Rohri on the Indus, where the Kotri-Rohri section of the North-Western railway crosses the Indus and rejoins the main line.

From **Ruk** to the west, on the Kotri-Rohri branch, a section of the system runs north-west through the Bolan Pass to **Quetta**, and ends at **Chaman** on the Afghan frontier. There is a south-west-running line, nearly 100 miles long, from Quetta to **Nushki**. A section of this line, which leaves it at the **Bolan**, runs north by Sibi and Harnai, and rejoins the North-Western railway at Bostan Junction.

The main North-Western line is continued north-east, on the left bank of the Indus, to Samasata, near the Sutlej. Here the line divides, and the southernmost section runs first north-east to Bhatinda, where it is joined by the Jodhpur and Bikaner railway and by a section from Rewari of the Bombay, Baroda, and Central India railway. At Bhatinda the line turns south-east to Delhi.

At Delhi the Bombay, Baroda, and Central India railway, the Great Indian Peninsula railway, the East Indian railway, the Delhi, Kalka, and Ambala railway to Simla, and the Oudh and Rohilkhand railway have stations.

A western section of the North-Western system crosses the Sutlej to Lodhran, where three sections are given off: one north-east to Amritsar, one north by east by Khanewal across the Ravi to Shorkot

Road, and one to the north-west to Sher Shah, on the Chenab. From Shorkot Road there are three branches of the North-Western: the eastern to **Lahore**, the central to Wazirabad, and the western to Malakwal. Of the two lines from Sher Shah the line to the north-east runs by Multan to Lahore, while the western line runs west to Mahmud Kot, where, sending a branch south-west to Dera Ghazi Khan, it turns almost due north by Bhakkar and Kundian to Mari-Kalabagh, near the North-west Frontier Province.

Lahore may be looked on as the centre of the North-Western system as Karachi is its sea terminus. From Lahore one section runs east to Amritsar, where it divides into three: one proceeding north-east to Pathankot, one south-east by Ludhiana to Meerut, and one south-west by Kasur to Ferozepore. The line south-west to Sher Shah by Khanewal and Multan has already been mentioned. Another line runs north-west from Lahore by Wazirabad, Rawalpindi, Attok, Nowshera, and Peshawar to Jamrud; from Campbellpur Cant, one to the south-west by Jand to Mari-Kalabagh; and from Nowshera, one to the north to Dargai.

### Madras

Madras, the fourth most important seaport of India, is the eastern end of all the important railway systems of the Deccan. Two systems, the **Madras and Southern Mahratta** and the **South Indian system**, end on Madras Harbour.

The Madras and Southern Mahratta consists of two sections, a north-eastern by Gudur and Bezwada to Vizagapatam, and a north-western by Arkonam, Renigunta, and Guntakal to Raichur.

The north-eastern section of the Madras and Southern Mahratta connects at Bezwada with the Nizam's Guaranteed state railway through Hyderabad, and with an east-and-west-running metre-gauge branch of its own system which runs by Guntakal, Gadag, Hubli Junction, and Londa to Goa.

At Guntakal it sends off a branch to the south, one section of which runs through eastern Mysore to Bangalore and Mysore, and another section through Madras by Pakala to Gudur.

From Hubli Junction a south-going section of the east-and-west metre section of the Madras and Southern Mahratta runs through northern and central Mysore to Bangalore.

From Gadag and Londa, sections run north through the Bombay Presidency, and join the Great Indian Peninsula railway at Hotgi and Poona respectively.

The north-east section of the Madras and Southern Mahratta joins the Bengal and Nagpur railway at Waltair, and so joins **Madras to Calcutta**.

The main line of the Madras and Southern Mahratta runs north-west from Arkonam through Guntakal to Raichur, where it joins the Great Indian Peninsula system, and thus connects Madras and Bombay.

One detached section of the Madras and Southern Mahratta line runs from Jalarpet on the South Indian railway north-west to Bangalore, the capital of Mysore.

The South Indian railway, the more southern of the two systems which have their eastern terminus at Madras, supplies by its main line and its branches all India to the south of Madras city. What must be looked on as the main line connects with the Madras and Southern Mahratta at Jalarpet, where it meets the section of the Madras and Southern Mahratta which runs from Madras to Bangalore.

The South Indian railway serves the whole of Southern India south of the south-west branch of the Madras and Southern Mahratta railway.

From Madras and from Arkonam, branches of the South Indian railway run, the one south-west and the other south-east, to Chingleput, from which the metre-gauge line is carried south-west to Villupuram. A section from Villupuram to Katpadi connects the South Indian system with the Madras and Southern Mahratta section from Guntakal by Dharmavaram to that place. From Villupuram an eastern branch line leads to Pondicherry and a south-eastern to Cuddalore. From Cuddalore the line runs nearly due south across the Cauvery or Coleroon to Mayavaram. From Mayavaram a south-east branch runs to Karikal and a south-west branch to Tanjore, where it joins the east-to-west line between Negapatam and Erode Junction, which passes through Tanjore and Trichinopoly. From Trichinopoly a section of this line runs first south-west and then south-east through Madura to Danishkoddi on the island of Rameswaram. From Danishkoddi a steamer takes passengers to Talaimanar, and from there a line runs to Colombo. From Madura a branch runs, first south and then east, to Tuticorin. A branch from Tuticorin by Tinnevely crosses the peninsula to Quilon, on the west side.

The broad-gauge part of the South India line runs first south-west from Jalarpet to Erode on the banks of the Cauvery, then west through Coimbatore to Shoranur.

At Shoranur a metre branch runs almost south to Cochin, while the broad-gauge line is continued to the north-west through Calicut, Tellicherry, and other towns to Mangalore.

Rangoon, in Burma, is the next most important seaport of

the Indian Empire. A line from Rangoon is carried north-westward to Prome on the Irawadi. At Letpadan this line sends off a metre-gauge branch to Bassein, the western part of the Irawadi delta. From Henzada, on the left bank of the river, a branch of this is carried northward to Kyangin. From Rangoon the main line of the Burma railways runs almost due north through Pegu and Thazi to near Mandalay.

From Pegu a branch which first runs north-east and then south-east ends at Martaban, on the gulf of the same name. At Thazi there is a branch to the north-west which ends at Myingyan, and a branch to the east which ends at Yawnghwe.

At Mandalay, while a narrower-gauge line has been carried to Nadoya, the metre-gauge line is carried north-eastward to Lashio, the administrative capital of the Shan States. From Sagaing, on the right bank of the river, the main line is continued northward through Shwebo, Wuntho, and Naba to Myitkyina, on the Irawadi, the present terminus.

A branch from Sagaing runs west and north-west by Monywa to Alon on the Chindwin river, a tributary of the Irawadi.

**Chittagong**, on the Bay of Bengal, is the terminus seaward of the Assam and Bengal railway. This is a metre-gauge railway which runs north-east through Laksam, Kulaura, and Lumding to the north-east corner of Assam.

From Kulaura it sends a branch north-west to Sylhet, and from Lumding a second branch north-west to Gauhati, where it is joined by a section of the Eastern Bengal railway from Dhubri. This is the only connection which at present exists between the Assam-Bengal system and the rest of the railway system of India.

Owing to the nature of the surface the railway system of Ceylon is only very partially developed. **Colombo**, the chief port, may be regarded as the centre of the railways of the island. The mountain region of Ceylon is, as has been said, towards the south and centre of the island, and is surrounded by a low coastal plain varying in width from 30 to 80 miles.

From Colombo one branch of the railway runs south almost along the coast through Galle, the old port of call for the island, to Matara, near Dondra Head, the most southern point of Ceylon. The northern section runs north almost along the coast by Negombo to Chilaw, giving off a section a little north-east of Colombo which runs north-east to Polgahawela. From Polgahawela another section runs first east and then north to Kandy and Matale, while from Peradeniya

another section runs first south through Kampola and Nawalapitiya to Bundaraweia and Nuwara Eliya.

By means of a branch from the line between Colombo and Jaffna which proceeds by the island of Mannar, Adam's Bridge, and the island of Pamban to Mandapan, the railway system of Ceylon is joined up with the South Indian railway system. The total length of the railways of Ceylon is still considerably less than a thousand miles.

### Comparison of Seaports

Some clear idea of the relative importance of the different ports of India may be got from the following considerations. Of Indian imports nearly equal quantities enter the country through Calcutta and Bombay, and quite three-fourths of the total imports enter the country by those two ports. The imports through Karachi, Madras, and Rangoon are in the order in which these towns are named, though the difference in the amount imported at each is not great, and the greatest amount of imports through any one of these ports is considerably less than one-fourth of the value of the imports through either Calcutta or Bombay.

The imports into India through other ports must therefore, it is clear, be comparatively small.

Of the exports from India not far from two-fifths leave the country by the port of Calcutta; a fourth less, or about one-third of the whole value of Indian goods exported, is sent out from Bombay; while the goods exported from Karachi exceed in value a third of the goods exported from Bombay, and Rangoon exports goods to the value of more than a fourth the value of goods exported from Bombay. The value of the exports from Madras is less than half the value of the exports from Rangoon, and the goods exported from Chittagong are equal in value to about three-fourths of the goods exported from Madras. The value of the exports from some of the less important seaports is therefore, it will be clear, considerable.

Taking the total sea-borne trade of India, import and export, in round numbers, as £300,000,000 a year, we may say that of this trade Calcutta does about 100 millions, Bombay about 90 millions, Karachi between 30 and 40 millions, Rangoon about 25 millions, and Madras about 15 millions.

Of articles imported into India the first place is taken by cotton

manufactures, which, if we include cotton twist, make up fully one-third of the total imports into the country, the cotton manufactures imported being alone of the value of nearly 30 millions. The next most important import is sugar, which is of the value of about 9 millions. Metals, including iron, steel, copper, &c., to the value of over 8 millions, are imported annually. Next to these in value are hardware, cutlery, and implements, railway plant and rolling stock; silk manufactures and raw silk, woollen manufactures and raw wool, each of which is imported annually to the value of over 2 millions. Glass and glassware, spices, carriages and carts, instruments and scientific apparatus, liquors including beer, spirits, wines, paper and pasteboard, are imported to the annual value of about 1 million sterling; while drugs and medicines, chemicals, building and engineering materials, jewellery and precious stones, and salt are each imported to the value of about half a million.

Of exports from India the most valuable is raw cotton, which is fully one-sixth of the value of the total exports, while the value of the cotton manufactures exported amounts to nearly 8 millions, or about one-third that of the raw cotton. Every year rice to the value of about 16 millions is exported, chiefly from Burma; while wheat, mainly from the Punjab, North-west Frontier Province, the United Provinces, and Central India, is exported to the value of about 9 millions. Seeds to the value of about 17 millions are annually exported from India, and jute, raw and manufactured, to the value of 22 millions. Hides and skins, raw and dressed and tanned, are exported annually to the value of about 9 millions, and opium and tea to the value of over 8 millions each.

### III. POLITICAL DIVISIONS

India, as has been pointed out, may be regarded physically as consisting of at least three regions: a mountain region on the north-west, north, and north-east, a great plain occupying the centre of the country and forming by far the most important, most productive, and most populous part of it, and a southern or peninsular part. Each of these regions must be still further divided. The mountain region is divided into the north-western mountain region, the northern mountain region, and the north-eastern mountain region. The great plain is divided into an eastern half and a western half, or the plains of the Ganges and the Brahmaputra, and the plains of the Indus and Sutlej. To these we may add a mountain region in the north-east and a desert region to the south-west. The peninsular region, like the other natural



divisions, is broken up into two or more regions, a **central plateau region** lying south of the great plain, and a **southern plateau region** south of the Tapti and the Mahanadi, the latter broken into two by the line of the Cauvery and the Palghat Gap. In addition to these there is the **island of Ceylon**, which is really a detached portion of southern or peninsular India. So large is India that with some of these geographical regions several political divisions are associated.

### NORTH-WESTERN MOUNTAIN REGION

The north-western mountain region is divided into a number of political areas, some of which are under the rule of the Governor-General of India, and form a direct part of the Empire, and all of which are in some degree subject to his authority.

Of the countries lying in this north-western mountain region we may enumerate: (1) as spheres of influence, **south-eastern Persia** and **Afghanistan**; and (2) as parts of the empire, **Baluchistan** and the **North-west Frontier Province**.

#### North-west Frontier Province

The North-west Frontier Province lies to the north-west of India as its name indicates, and stretches from the Hindu Kush on the north to Baluchistan and the Dera Ghazi Khan District of the Punjab on the south. It is bounded on the east by Kashmir and the Punjab, and on the west by Afghanistan.

The province consists of Hazara District on the left bank of the Indus, of the Peshawar, Kohat Bannu, and Dera Ismail Khan Districts on the right bank of that river, and of the mountainous tribal country lying between these and Afghanistan.

Its area may be taken at about 40,000 square miles, of which only about one-third is British territory. The rest of the country is in the possession of tribes under the control of the agents of the Governor-General. The district of Hazara is a region of wooded hills, spurs from the Outer Himalayas, and of narrow, often isolated glens. Towards the south the hills open out, and fertile plains take their place. The four districts to the west



of the Indus are hilly in the north, and end in the south in a barren plain having the Indus to the east of it, and the Sulaiman mountains to the west.

The parts of the province between these districts and Afghanistan are wilder and more rugged. Spurs running southward from the western end of the Mustagh or Karakoram mountains divide the northern part of the province into deep narrow valleys enclosed by lofty ranges of hills, bare towards the north but wooded towards the south.

**Climate.**—There are two rainy seasons, a summer and a winter; the former being due for the most part to the deflected monsoon currents from the Arabian Sea and the Bay of Bengal, and the latter to the condensation on the hills of the moisture in the west and north-west winds blowing from the Mediterranean and the Caspian. The heaviest rainfall, 45 inches, is in the Hazara district in the neighbourhood of the Himalayas, and is due most largely to the deflected summer monsoon currents. The lightest rainfall is at Dera Ismail Khan, between the Sulaiman mountains and the Indus, and does not amount to more than 9 inches.

In 1911 the population of the British part of the province, only one-third of the whole, was in round numbers 2,200,000. The population of the whole province may be reckoned at a little over 4 millions.

Each of the five districts into which the British part of the province is divided is under a Deputy Commissioner, and is for convenience subdivided into tahsils, each under a tahsildār, who has control of the finances and administers justice, civil and criminal, in the subdivision.

The territories lying north and west of the British districts have been divided into political agencies. There are five of these: (1) Dir Swat and Chitral Agency; (2) the Khyber Agency; (3) the Kurram Agency; (4) Northern Waziristan; (5) Southern Waziristan.

**Towns.**—Peshawar, the capital, is the largest city in the province. It has a population of about 100,000, and is the terminus of the main north-western line, but it has a branch 10 miles long to Jamrud, the fort at the entrance to the Khyber Pass. The other important towns in the province are Dera

Ismail Khan, Kohat, and Bannu, each with large cantonments.

### Baluchistan

Baluchistan is bounded on the north by the North-west Frontier Province and by Afghanistan; on the west by Persia; on the south by the Arabian Sea; and on the east by Sind and the Punjab.

It is an oblong stretch of country, having an area of fully 130,000 square miles, and consists of British Baluchistan, with an area including the administered territories of between 50,000 and 60,000 square miles, and of the native states of Kalat and Las Bela, the latter a supposed dependency of the former. The native states have an area of about 80,000 square miles.

Baluchistan occupies the south-eastern corner of the tableland of Iran, and is practically enclosed in a dependent loop of the Alpine-Himalayan axis, the more eastern branch of which forms the eastern edge of the plateau, and the more western of which stretches from the western end of the Safed Koh mainly through Persia, and separates the eastern inland drainage areas of Afghanistan and Baluchistan from those of Persian Khorasan and Kerman.

Baluchistan may be considered to consist of four natural regions: the Upper Highlands, the Lower Highlands, the southern and south-western slopes of the **Kirthar** and **Pab** mountains, and a desert region consisting largely of open plains covered with black gravel. The mountains of the south are mostly of limestone conglomerate, and consist of steep rocky cliffs broken across by narrow gorges. Some of the hills of South Makran are of still more recent formation, and the clay of which they are formed has in many cases been carved into most fantastic shapes.

There are no rivers with a large permanent flow of water in Baluchistan. Wherever possible the rivers are used for irrigation. The largest river in the country is the Hingol or Girdar Dhor. The Zhob drains the north-east part of the country and falls into the Indus. The southern side of the hills drained by the Zhob is drained by the **Lora**, which ends in the Lora Hamun, while the south-west of the country is drained by the Mashkel and its tributaries into the Hamun-i-Mashkel.

**Climate.**—Nowhere is the rainfall more than 12 inches in the year, and that occurs only in the Upper Highlands in the neighbourhood of Quetta. In the plains it is much less, rarely exceeding 5 inches, and in some cases not being more than 3 inches annually. The differences both daily and annual in temperature are extreme. In a way it may be said that these depend on the elevation; but, as in the Sahara and other similar regions the daily range of temperature is great, so it is in Baluchistan. The average temperature for July in the low plains bordering on Sind is nearly 100 degrees. In the Upper Highlands the

heat is never so intense. At Quetta the average July temperature is a little less than 80 degrees. The prevailing winds in Baluchistan are from the north-west. These blow almost constantly, and are scorching in summer and bitterly cold in winter.

**Towns.**—**Quetta**, the chief British town, stands on an open plain between 5000 and 6000 feet above sea level, and has a population of between 30,000 and 40,000. Among other places in Baluchistan may be mentioned **Loralai**, **Sibi**, and **Nushki**, and the seaports **Gwadar**, **Pasni**, and **Ormara**.

**British Baluchistan** is under a chief Commissioner, who is also Agent to the Governor-General. The Khan of Kalat is nominally the overlord of the **Jam** of Las Bela, but in reality the latter is independent, though under the control of the British Resident at Kalat. Kalat occupies the whole of the centre and of the south-west of Baluchistan, and, with the exception of the plains of Kharan and Kachhi, is wholly mountainous.

**Las Bela**, a small protected state south of Kalat, through which the main route between Sind and Persia passes, has Sind to the east and Makran to the west of it. The climate is hot and far from healthy, and the small low-lying plain is drained by the Porali. The total population of Las Bela is little over 50,000. The Jam is liable to be called on to assist the Khan of Kalat in active service, otherwise he is quite independent of that ruler. The chief town, **Bela**, prettily situated on the Porali, has about 6000 inhabitants.

### Persian Sphere

By a convention entered into with Russia in 1907, the south-western part of Persia lying between Baluchistan and the Persian Gulf was recognized as being within the British sphere. This includes what is called Persian Baluchistan and Kerman—all Persia, in fact, south of a line drawn from the Afghan frontier almost due west to Birjand, then south-west to Kerman, and south by west from Kerman to Bunder Abbas.

This portion of Persia is much like Baluchistan, and suffers like it from an insufficient rainfall. It is crossed by mountains, some of which rise to a height of nearly 15,000 feet. These traverse fertile districts, breaking them up into longitudinal valleys, some of which are exceedingly beautiful and fertile. Some of these chains are volcanic, like the mountains of Southern Italy and Sicily; and Koh-i-Taftan, on the

border of British Baluchistan, rises to a height of over 13,000 feet. The drainage, like that of Baluchistan, is into the Arabian Sea in the extreme south, with an inland drainage area north of it.

The climate of the region varies with the height above sea-level. The desert of Kerman lies only about 1000 feet above sea-level, but even the cooler airs of the hill regions are often very chilly. Some of the upper valleys have, however, a pleasant and healthy climate. Cotton and gums and dates scarcely equalled for quality are the chief products.

**Towns.**—Kerman, the chief city, is noted for its manufacture of carpets. Bunder Abbas, though the climate is unhealthy, is the chief port of the region. Birjand, on the Khus, is an important inland town.

## AFGHANISTAN

Afghanistan is the geographical name given to the mountain region lying between Northern Persia and north-western India. It is an oval-shaped country, bounded on the north by Russian-Turkestan, on the east and south by the North-west Frontier Province and Baluchistan, and on the west by Persia.

Its long axis stretches from north-east to south-west. Following the direction of the long axis, a chain of lofty mountains, the Hindu Kush, runs first south-west from the borders of the Pamir, and then west as the Koh-i-Baba, the Band-i-Baian, and the Safed Koh, to the borders of Persia.

Afghanistan is so divided by these mountains that we may consider it to consist of three river basins: the Oxus basin in the north, the Helmand basin in the south-west, and the Kabul basin in the north-east.

**Climate.**—The climate of the country, owing to the differences in elevation of parts of its surface, is very varied. Everywhere it is extremely continental, and great differences of temperature are experienced within short periods.

At a height of over 5000 feet all over the country the cold in winter is intense. Even at Herat, which is not nearly so cold as Kabul and other of the higher-lying places in the east of the country, the Boundary Commission is said to have met with 44 degrees of frost; that is, the thermometer fell 12 degrees below zero.

The heat in summer is almost everywhere very great. At Kabul, which is nearly 6000 feet above sea-level, the thermometer rises to

sometimes close on 100 degrees in the shade. The region is an arid one, the rainfall at Kabul being only a little over 10 inches annually, while in places to the west and south-west it is still less. The prevailing winds are from the north-west.

**Population and Government.**—The population is about 6 millions, and the government is an absolute monarchy under the Amir of Kabul.

There are five governorships, each under a governor or ruler responsible to the Amir. North of the Hindu Kush and their continuations are Badakshan in the extreme north-east, Afghan Turkestan in the centre, and Herat in the west. South of the mountain line the governorships are Kabul in the north-east and Kandahar in the south.

**Towns.**—In a country like Afghanistan, sparsely peopled and with few manufactures, the towns are, as one would expect, small. A peculiarity about them is that owing to the extent of their orchards some of them cover a very considerable area.

**Kabul**, the capital, lies on a plain fully 6000 feet above sea-level. It is noted for its fruits, and is surrounded with mountains. It is at the junction of a number of routes leading from India to Central Asia, and is a great trading centre, with a population of over 50,000.

**Herat**, 3000 feet lower, near the Persian border, was at one time a great mart for Persian, Chinese, Indian, Afghan, and Tartar products, and reckoned one of the most flourishing of Eastern cities. It stands on the Hari Rud, and is noted for its fruit, its horses, and its manufactures of silks, carpets, sheepskin caps and cloaks, and rose-water. It is a place of very considerable strategic importance.

**Kandahar** lies between three and four thousand feet above sea-level, and is a walled town. The neighbourhood is fertile, and is noted for its fruits. The town itself manufactures silks, felts, and rosaries.

**Ghazni**, to the north-east of Kandahar, was the capital of the Indian conqueror Mahmud of Ghazni.

## THE NORTHERN MOUNTAIN REGION— THE HIMALAYAS

The stupendous mountain region which encloses India in the north includes in the extreme north-west the state of **Kashmir and Jammu**, more than half of which lies in the mountain region. South-east of Kashmir is **Chamba State**, which lies north of the Kangra district of the Punjab. East of the Kangra district are the group of feudatory states known as the **Simla states**. East of these lies the Tehri-Garwhal State, and still farther east the Kumaun district of the United Provinces, the district to which the Tehri and Rampur states are attached.

Much of this western section of the Himalayas has been carefully examined; but, from the **Kumaun Division, Nepal** stretches for 500 miles east, occupying the mountain region, and forming a tract of which little more is known now than was known at the beginning of the nineteenth century.

To the east of Nepal is the Bengal district of Darjeeling, which has to the north of it the native state of **Sikkim**. The latter is separated from **Bhutan**, in the north, by a narrow wedge of Tibetan territory known as the Chumbi Valley. Bhutan is an independent kingdom of the Eastern Himalayas about which much more is known than about Nepal.

During the British-Tibetan expedition in 1904 a survey of parts of Bhutan was made by an Indian surveyor.

The mountain parts to the east of Bhutan are occupied by tribes, mostly savages, with whom it is impossible to have any peaceful dealings.

These hill tribes sometimes own allegiance to Tibet; sometimes they assert their complete independence. It will thus be seen that by far the larger portion of the Himalayas is not merely an only partially surveyed geographical region, but that much of it is geographically an unknown land, and that only the north-western part of the great mountain barrier can be spoken of with average certainty.

### Kashmir and Jammu

**Position, &c.**—This dependent state occupies the whole of the north-west of the Himalayan mountain region. It may be described as roughly rectangular in shape, the length from east to west being on an average considerably more than the breadth from north to south. It stretches from latitude  $32^{\circ} 30'$  north to a little beyond  $37^{\circ}$  north, and from a little beyond  $72^{\circ}$  east longitude to a little beyond  $80^{\circ}$ . Its breadth at the broadest part is about 300 miles, and its greatest length is between 400 and 500 miles.

The whole state has an area of about 81,000 square miles, and its population may be taken as a little more than 3 millions. It is bounded on the north by Chinese Turkestan, on the east by Tibet, on the south by the Punjab, and on the west by parts of the North-west Frontier Province.

**Physical Features.**—With the exception of a narrow



strip of plain towards the south-west, the country is entirely mountainous, and rises from the plain by a series of stages. The plain abutting on the Punjab is backed by a line of low hills, ranging from 2000 to 4000 feet high, a continuation of the Siwaliks or foothills of the Himalayas. These lead to a region of duns, or lateral valleys, beyond which rise the **sub-Himalayas**.

This tract, varying in breadth from 25 to 35 miles, forms a temperate and, in most cases, well-cultivated region cut off on the north by the steps of the **Pir Panjal**, the sub-Himalayan mountains running from east to west which separate Jammu from Kashmir. The Panjal rises to a height of from 8000 to 15,000 feet, and stretches from Muzaffarabad on the **Jhelum** to Kishtwar on the **Chenab**. The latter river drains the eastern part of Jammu. North of the sub-Himalayas, and between them and the main chain, is the open valley of Kashmir, surrounded on all sides by lofty mountains. It has to the north of it the main Himalayan chain, which extends from **Nanga Parbat**, near the bend of the Indus, south-east through Kashmir and Jammu.

Not far from where the eastern wall of the valley springs from the main chain, a spur of hills starts westward and forms the north-western boundary of the valley of Kashmir. After about 100 miles in this direction the chain of hills, which has a height of about twelve or thirteen thousand feet, turns towards the south till it meets the Panjal near where the **Kishen Ganga** joins the Jhelum. The valley of Kashmir has a length, therefore, of nearly 120 miles, and a breadth of from 50 to 70 miles, and is drained by the Jhelum and its tributaries.

The part of Kashmir and Jammu lying north of the main chain of the Himalayas includes the slopes on both sides of the Mustagh or Karakoram Range. It is drained by the Indus and its great tributaries the Shyok and Gilgit on the right bank, and the Zaskar and Suru on the left.

**Climate.**—Where the valleys are surrounded by lofty mountains as here, the slow movement of the air from the mountain to the valley lowers the temperature below the level of the temperature of places at the same height on the southern slopes of the outer Himalayas. The effect of the snow that accumulates in the valleys in reducing the temperature is also very great.

While sport draws crowds of people to this region, Kashmir is now recognized as one of the most popular of health resorts for Europeans resident in India. There are two seasons of rainfall, the **hot-season rainfall** from June to September, and the **cold-season rainfall** from

December to April. The hot-season rainfall is of great importance for cultivation in the low-lying parts to the south-east. Forests cover a part of the middle slopes of the mountains, forests of **deodar, oak, fir,** and **pin**es.

Rice is grown up to a height of 7000 feet. Besides rice, maize, cotton, tobacco, hops, millet, buckwheat, amaranth, pulses, are the usual autumn crops. Wheat, barley, rape, flax, peas, and beans are the principal spring crops.

Next to rice, maize is the most important crop in Kashmir, and as a rule is grown on dry land. The chief oilseed is rape, which is grown mostly on the soft reclaimed swamp lands. Linseed is cultivated in Kashmir, the best fields being on the lower slopes of the mountains. Fruits are grown in great variety and include apples, pears, grapes, mulberries, walnuts, hazel nuts, cherries, peaches, apricots, raspberries, currants, and strawberries. Quinces, almonds, and pomegranates are also grown.

The cattle of the country are small and hardy, and generally black in colour. On the approach of summer all save the plough bullocks and the cows in milk are driven off to the mountains, and only return to the villages in the autumn. Sheep and goats are kept, the former yielding wool of an excellent quality. The ponies of Kashmir are small but hardy. Poultry is plentiful, and geese and ducks are common.

The trade of Kashmir with the rest of India has been growing rapidly of recent years. The main line of communication is by the Jhelum valley route, though besides this there are the roads across the Banihal Pass from Jammu and over the Pir Panjal from Gujrat. Of articles imported into Kashmir by far the most important is piece goods, European and Indian, and next in value are sugar, salt, tea, and tobacco, in the order named. The most important article of export is ghi, while woollen piece goods, fruits, hides and skins come next in value.

In addition to the trade between Kashmir and India a considerable body of transit trade between India and Central Asia, and India and Tibet, passes through Ladakh, the most eastern of the provinces of Kashmir. The imports from Central Asia into the Punjab through Ladakh consist chiefly of raw silk, Russian gold coins, and raw wool, while the chief exports consisted of cotton piece goods, silk goods, and coral.

**Government.**—Under the arrangements made in 1905 the Maharaja administers the state, and business requiring his orders is laid before him by the chief minister. The Resident who represents the Indian Imperial Government at the Maharaja's Court has supreme control, and the management of the finances, of the state forests, and of public works is in the hands of British officers, whose services have been for the time being placed at the disposal of the Darbar.

**Towns.**—There are only two towns of any size, Jammu and Srinagar. Srinagar is a large and important town built on both sides of the Jhelum, and standing at a height of over 5000 feet above sea-level. Owing to its position the town is subject to floods, which occasionally do considerable damage. Earthquakes, too, are of frequent occurrence, and in former times cholera was a desperate scourge. The shawls for which Kashmir was renowned are now only a memory.

**Jammu** is the winter capital of the Maharaja, and is connected with Srinagar by a route which crosses the Banihal Pass and passes through Islamabad. It lies on the right bank of the river Tawi, a tributary of the Chenab.

**Leh**, near the Indus, is the capital of Ladakh. The chief place in Baltistan is Skardo.

### Chamba

Chamba is a native state under the control of the Commissioner of Lahore. It is a little more than half the size of Yorkshire, and is wholly surrounded by mountains. It has to the north and west of it Kashmir, and to the east and south-east the British district of Kangra.

**Climate.**—With altitudes of from 2000 to 22,000 feet every variety of climate is met with. At above 5000 feet the temperature of summer is moderate, and the cold in winter intense. In the lower tracts the heat in summer is great; and, generally, in the autumn the climate is unhealthy save among the mountains.

**Productions.**—The food crops, as in Kashmir, are rice, maize, pulses, millets, and potatoes. Tea is grown in some parts, as is also the poppy. The cattle are generally small. Sheep are kept for their wool, and goats are numerous.

**Government.**—The Raja is head of the state, and the Wazir is the chief executive officer, and is the head of the judicial department of the state, while the Bakshi controls the finances.

**Towns.**—Chamba, the capital, contains several interesting temples, of which that of Lakshmi Narayan is the most interesting.

### Simla Hill States

The Simla Hill states are a collection of native states bounded on the north and north-west by the Jullundur Division of the Punjab, on the south-west by the plains of Ambala, on the south-east by the Dehra Dun, and on the east by Garwhal or Tehri.

**Surface, &c.**—In this region the mountains rise from the plains of Ambala to the central chain of the Western Himalaya, which may be said to terminate in the west of Bashahr, one of the states, while a lateral spur running south-west divides the basin of the Sutlej from that of the Jumna.

The chief rivers of the region are the Sutlej and its tributaries, the tributaries of the Jumna, and in the west the Beas. The chiefs of the hill states have full power over their subjects, except that death sentences passed by them require the confirmation of the superintendent of the hill states, who is also the Deputy Commissioner of the Simla District.

The Himalayan tract of the United Provinces comprises the districts of Garhwal, Almora, Dehra Dun, and a great part of Naini Tal, together with the native state of Tehri (or Tehri-Garhwal). This mountainous region includes some of the finest scenery in the world, and has in it the sources of the Ganges and the Jumna. There are numbers of famous temples and numerous places of pilgrimage on the upper course of the Ganges, and thither annually thousands of pilgrims from all parts of India flock.

### Tehri

**Tehri state** lies wholly in the Himalayas, and consists of narrow valleys separated by lofty mountain spurs. The grain of the state, that is, the general lie of the valleys and of the mountain ridges, and as a consequence of the river courses, is from north-east to south-west.

The state is bounded on the west and north by Simla Hill states, on the south-west by the Dehra Dun district, and on the south-east and east by the Garhwal district of the United Provinces. It has an area of over 4000 square miles.

The state contains the sources of both the Ganges and the Jumna, and these two rivers drain the whole state.

The **Bhagirathi**, as the Ganges is first called, flows almost through the middle of Tehri, until it meets on the south-east the Alaknanda from the borders of Garhwal and Tibet.

The **Jumna** rises in the north-west of Tehri, on the slopes of the Bandar Panch, and forms for a part of its course the western boundary of the state.

**Government.**—The Rājā has full powers, and the political agent is the Commissioner of Kumaun. Under the Rājā the Wazir is the principal executive officer, while revenue cases are settled by the tahsildār and the deputy collectors.

The forests are valuable, and have been leased to the British Government. They yield valuable chīr and other timber, and among the other trees may be mentioned deodar, sal, and various sorts of oak and pine.

Tehri, the capital, though a small town, is the chief commercial centre of the state, and has a busy market in which imported goods are sold.

## Nepal

Nepal occupies the southern slopes of the Himalayas for about 500 miles, and stretches along the north of the United Provinces and of the new province of Bihar and Orissa. On three sides, west, south, and east, it is surrounded by British territory, and it has to the north of it Tibet. It lies between the eightieth and the eighty-eighth degree of longitude. It is a long, narrow land, 500 miles long from east to west, and only from 90 to 100 miles broad. Its total area is estimated at about 54,000 square miles.

**Surface Features.**—The country may be said to consist of the narrow belt of marshy ground at the foot of the mountains, the belt to which the name Tarai has been given; of the foothills themselves, a range of sandstone hills with lateral valleys or duns behind them; and of the main chains of the Himalayas divided here probably as elsewhere, into sub-Himalayas and central chain.

The hill country of Nepal which rises behind the foothills and the duns is composed of a series of ranges enclosing valleys situated at a height of from 5000 to 10,000 feet. These valleys, with the exception of the valley of Katmandu, are said to be small. They are as a rule

well watered, highly cultivated, and thickly peopled. The country is broken up by lateral ridges into three distinct basins, that of the Kauriala or Gogra in the west, of the Gandak in the centre, and of the Kosi in the east. The western division of Nepal is divided into two by the Kauriala: a smaller western division between the Kali Ganga, which separates Nepal on the west from the United Provinces and the Kauriala, and a larger eastern division between the Kauriala and the lateral mountain ridge which, running south from Dhaulagiri, separates the basin of the Gogra from that of the Gandak. The central division, the Gandak basin, is known as the country of the Seven Gandaks, from the seven streams which unite to form that river.

By these seven streams the whole of Nepal between the Dhaulagiri ridge and Gosainthan is drained. In the same way the eastern division is known as the "Country of the Seven Kosis".

**Climate.**—Little is known of the interior of the country, from which, with the exception of the valley of Nepal, Europeans are carefully excluded. The climate of the Tarai is unhealthy, as is that of the lower duns between the sandstone hills and the sub-Himalayas up to three or four thousand feet. Above this the climate is splendid, resembling, as far as temperature is concerned, the climate of Southern Europe, though the rainfall is very much heavier. The annual rainfall at Katmandu is about 60 inches, and generally throughout the region the rainfall is heavier than it is in the western Himalayas, and increases from west to east.

**Productions.**—Rice is the most common crop, and the cultivation of the valley of Nepal, the only part known really to outsiders, is almost entirely by hand. Wheat is also grown in Nepal, but it is not much used as a food by the people. It is employed chiefly in the manufacture of coarse beer and spirit. Barley and oats are also grown, the latter being used only for feeding horses.

The **forests** of the sub-Himalayan region yield valuable timber trees, including the **Sal** and **Assina**. In the sub-Himalayan region, too, are found the **babar grass**, locally used for fodder and rope-making, and exported to make paper; and the **bamboo**, which is here, as everywhere in India, turned to so many useful purposes.

The mineral wealth of the country is said to be great, but the absence of coal will make it difficult to turn it to good purpose.

The chief manufactures are coarse cotton cloth woven by the women, woollen blankets, and a coarse kind of paper. The **Newars** are the only mechanics of Nepal. Formerly they were noted for their skill as brass-workers and wood-carvers.

**People, &c.**—The people of Nepal number probably about 5,000,000, of whom at least one-eighth live in the valley of Nepal in the neighbourhood of Katmandu. The Nepalese are a mixed race, descendants of the aboriginal Mongolian tribes, and of the Rajputs and other Hindus, who, on the invasion of India by the Muhammadans, sought refuge among the mountains. The Gurkhas are the ruling race.

The languages of Nepal are of the Tibeto-Himalayan branch of the Tibeto-Burman family. The common language or lingua franca is Parbatya (hill speech), which has some likeness to Hindi. In Western Nepal the lingua franca is Western Pahari, just as the language used in Eastern Nepal is known as Eastern Pahari.

The religion of the ruling race is Hinduism. Most of the other tribes profess Buddhism, though the Buddhists have adopted many of the Hindu doctrines and practices.

**Government.**—The sovereign of the country is known as the Maharajadhiraja, but the real ruler is the Prime Minister, who has the title of Maharaja.

Next in importance is the commander-in-chief, who usually succeeds to the office of Prime Minister when the office falls vacant.

A British Resident with a small escort of Indian Sepoys lives in the capital, but does not interfere in the internal affairs of the country. The Government of Nepal, however, is not allowed to take Europeans into its service without the consent of the Indian Government.

**Towns.**—The three largest towns in Nepal are all in the valley. They are Katmandu, the capital on the Bagmati, a tributary of the Buri Gandak. It has a population estimated at about 50,000; Patan, two miles to the south, has a population of about 30,000; and Bhatgaon, four miles to the south-east, has a population equal to that of Patan.

The site of Kapilavastu, the capital of the Sakyas, the tribe to which Buddha belonged, is near Paderia in the western Tarai of Nepal; and two of the most renowned Buddhist shrines, those of Sambhunath and Budnath, are at no great distance from Katmandu.

### Sikkim

Sikkim lies to the east of Nepal, and is bounded on the north and east by Tibet, and on the south by the Darjeeling district of Bihar and Orissa. It is called by the Tibetans Denjong or Dejong (the rice-land), and the people of the country are called the Rong-pa or "valley folks".

It is separated from Tibet on the north by the main chain of the Himalayas, and from Nepal on the west and Tibet and Bhutan on the east by chains running at right angles to the main chain. From the eastern side of the chain which separates Sikkim from Tibet on the east, rises the peak of Kinchinjunga, one of the highest mountains in the world.

The area of Sikkim is less than 3000 square miles. It lies between

the foothills and the central Himalayas, rising rapidly from a height of from 1000 to 5000 feet in the south to 15,000 or 17,000 feet in the north.

**Climate.**—It may be considered as divided into three climatic zones, and three zones of corresponding vegetation: the tropical, which extends to a height of 5000 feet above sea-level; the temperate, which reaches to a height of 13,000, the upper limit of trees; and the Alpine, above 13,000 feet. The rainfall is heavy, amounting to considerably over 100 inches annually. The rainy season lasts from March to October, and from November to February the rainfall is light.

**Productions.**—As might be expected from its situation and climate, Sikkim is wonderfully rich both in plants and in animals. It is said to have over 4000 different kinds of flowering plants. Maize, buckwheat, rice, wheat, and barley are the chief grains grown. There are more than 200 different kinds of ferns, and over 400 varieties of orchids. Sikkim has, in fact, representatives of almost every plant association to be met with between the equator and the poles.

Plantains, oranges, and other fruits are grown in the gardens. There are forests of oaks, cherry trees, and laurels.

Tigers are rare; but the leopard and the clouded leopard are common, and the snow leopard inhabits the higher altitudes. Many other varieties of the cat-tribe, including the marbled cat, the Indian civet cat, and the leopard cat, are met with. Cattle, yaks, and sheep are bred.

**Government, &c.**—The country is governed by a Maharaja, whose palaces are at Tumlong, close to the eastern or Tibetan boundary, and at Gangtok. He acts under the advice of the Political Officer of the Indian Government who is stationed at Gangtok.

The population numbers about 60,000. The people are Mongols, and are almost entirely engaged in agriculture, over 90 per cent of the total population being employed in tillage. They speak mostly languages of the Tibeto-Burman family.

Sixty-five per cent are Hindus in religion, and the remaining 35 per cent are Buddhists.

## Bhutan

**Bhutan** is an independent state in the Eastern Himalayas. It is bounded on the north and east by Tibet, on the south by Assam and Bengal, and on the west by the Darjeeling District of Bengal, by Sikkim, and the Chumbi Valley. It lies between 88° and 92° east longitude and between 26° and 28° north latitude, and has an area estimated at about 20,000 square miles.

**Surface.**—The country is mountainous. It has to the north of it the main chain of the Himalayas, which separates it from Tibet. From the central axis ridges run southwards—in Western Bhutan north-west to south-east, and in Eastern Bhutan north-east to south-west—breaking up the country into a succession of narrow valleys, which run far back into the mountains.



**Climate, &c.**—The climate varies with the height, and as the mountains are steep a traveller may in a single day's journey pass from the cold of the Arctic regions to the warmth of the Tropics. Terrible storms at times sweep through the valleys, and on the heights the rain comes down at times in floods.

The lower hills teem with animal life. Tigers are rare, but elephants are so numerous as to constitute a danger to the traveller. Leopards are met with in the valleys, the musk deer and wild hog at great heights, and the barking deer everywhere. The bear and the rhinoceros are found, and squirrels, pheasants, partridges, jungle fowl, and pigeons are common.

As in Sikkim, the chief crop here is maize, which is grown up to a height of 7000 feet. Wheat, buckwheat, and mustard also are grown; but the most paying crops are cardamoms and terrace-grown rice, both of which need irrigation; and this, as it involves a large outlay on the part of the cultivator which he is seldom willing to incur, is very little practised. Silk also is produced.

The manufactures are few, and all are intended for home consumption. Bhutan exports into Bengal mainly timber and oranges, and imports European piece goods, silk, betel nuts, and tobacco.

**Government.**—The Bhutanese recognized till 1907 two supreme authorities—a spiritual and a temporal. The Dharma Raja was looked upon as the spiritual head, and the Deb Raja as the temporal.

The former is a very high incarnation of Buddha, and the latter, though supposed to be chosen by the Council of State, was in reality only appointed by the Governor of East or West Bhutan who happened to hold the supreme power at the time.

These rulers are known as the Penlops of Paro, West Bhutan, or of Tongsa, East Bhutan. In 1907 the Tongsa Penlop was appointed hereditary Raja, and an end was put to the dual government. By an agreement made in 1910, while the Government of India does not interfere in the internal affairs of Bhutan, the Bhutanese agreed to be guided in their external relations by the advice of the Indian Government. There is, however, no British Resident, but the Political Officer in Sikkim is the intermediary between Bhutan and the Indian Government.

**People and Towns.**—The people are Mongols, and speak a Tibetan dialect.

They are Buddhists, and consist of three classes: the Penlops or governing class, the priests, and the cultivators. Their number is variously estimated at from 50,000 to 500,000.

The chief towns are **Punaka** or **Dosen**, the winter capital, and **Trashi-chöd-zong** or **Tassisudon**, the summer head-quarters. **Paro** and **Tongsa** may also be mentioned.

### Eastern Himalayas

East of Bhutan the Himalayas are inhabited by savage tribes with whom no intercourse seems possible, save in the form of expeditions to punish them for past raids on the inhabitants of the plains. These punitive expeditions have in the past acted as deterrents, but have had to be renewed at intervals.

Save for the information acquired by these expeditions, we know scarcely anything about the four hundred miles of mountain country which lies between Bhutan and north-eastern Assam. From these raids we have learned that the people of this region are of Tibeto-Burman origin; that they consist of a number of different tribes, called, as we go from west to east, Akas, Daflas, Miris, and Abors. The wild rubber which grows on the eastern Himalayas is collected by these hillmen and brought into Assam to be sold.

**Aka Hills.**—These hills lie to the north of Bengal and Assam, and like those of Bhutan consist of steep ridges covered with dense forests. The Akas are brave, and the men fairly strong and well made, and though a small tribe they are warlike and independent.

Their country is difficult of access, and expeditions to punish them for their raids are exceedingly costly in proportion to the punishment which in such a country they are able to inflict. The tribe receives a yearly allowance from the Indian Government so long as their behaviour is good.

**Dafla Hills.**—This section of the Himalayan range lying to the east of the Aka Hills is occupied by the Dafla tribes. These are Mongolians of Tibeto-Burmese origin. They are short and sturdy, but are much less united than the Akas, their western neighbours, and are therefore much less troublesome to Government. Their country is, like that of the Akas, difficult of access.

**Miri Hills.**—These seem pretty much like the Aka and Dafla Hills, and the Miris resemble closely the Akas and the Daflas. Like them, they are of Tibeto-Burmese origin; but as a rule they are a tall, well-made race, with pleasant faces of a Mongolian type. Unlike their neighbours, both on the west and on the east, they have never given any trouble to the Indian Government, and large numbers of the tribe have settled in Assam.

**Abor Hills.**—This is a section of the Himalayas north of Lakhimpur, lying immediately west of the Debang tributary of the Brahmaputra and east of the Miri Hills. It is occupied by a number of Tibeto-Burmese tribes, who are spoken of as Abors or "unknown savages".

The wildness of the country and the savagery of its inhabitants have prevented anything but a very partial exploration. The mountains seem of considerable height, and covered with dense forests. They appear also to be intersected by large rivers which make their way to the plains through precipitous gorges.

The country seems divided into two by the Dihang, which runs through it first south and then east, and which, it has been concluded, is the same river as the Tsan-po or Brahmaputra.

The Abors are short, sturdy savages, with markedly Mongolian features. By their raids they have made a fertile part of the country on the right bank of the Brahmaputra almost uninhabitable.

## NORTH-EASTERN BOUNDARY REGION— BURMA

**Burma** forms a province of the Indian Empire administered by a Lieutenant-Governor. It occupies the north-west of what is called the Indo-Chinese peninsula, and forms the eastern rampart of the empire.

The Indo-Chinese peninsula is, it must be remembered, the most eastern of three peninsulas projecting from the south of Asia.

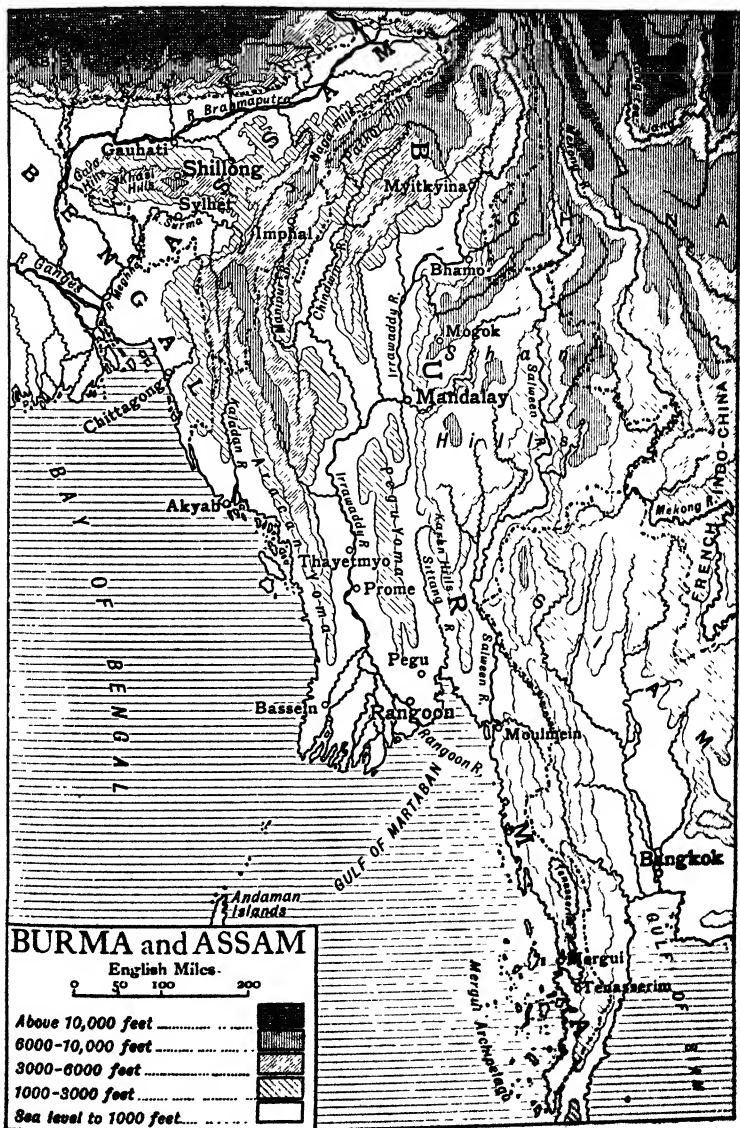
Burma extends along the eastern side of the Bay of Bengal from  $9^{\circ} 58'$  to  $27^{\circ} 11' N.$ , and from  $92^{\circ} 11'$  to  $101^{\circ} 9' E.$  It has an area of over 260,000 square miles, of which about three-fourths are directly under British government.

Leaving out the southern part, Tenasserim, Burma may be described as lozenge-shaped. It has to the north of it Tibet and China. The boundary line between Burma and these countries seems to run through a very mountainous region, an eastern prolongation of the Himalayas, and has not yet been definitely fixed. Burma is divided from Assam on the north-west by a continuous mountain ridge. On the east Burma is bounded by the Chinese province of Yunnan, the Chinese and the French Shan States, and by Siam, and on the west and south-west by the Bay of Bengal. It stretches from the Bay of Bengal on the west to the Mekong River on the east, and is about 500 miles broad at its broadest.

**Surface.**—The surface of Burma is covered almost entirely with folded mountains trending in a southerly direction, and separated by valleys opening out towards the south. Considered as to its surface, Burma would thus seem to consist naturally of four divisions: (a) a Western, or coastal, made up of the Chin Hills and the Arakan Yomas, and the country between these and the Bay of Bengal, and of the province of Tenasserim in the south; (b) a central or river-valley portion formed of the basins of the Chindwin and the Irrawaddy, the Sittang and the Salwin; (c) of a plateau region in the east; and (d) of a mountain region in the north.

The mountain region towards the north is almost unexplored, but is known to consist of lofty mountains like the Himalayas in structure, with south-trending spurs, some of the peaks of which, as in the case of the ridges between the Salwin and the upper waters of the Irrawaddy, reach a height of over 15,000 feet.

**Rivers.**—Of the rivers of Burma the most important is the Irrawaddy,



formed by the junction of the Mali-kha and N'mai-kha (kha = stream) in the district of Myitkyina, the present terminus of the railway. The Irrawaddy is navigable all the year round up to **Bhamo** on the Chinese border, 900 miles from its mouth, and in the dry season to the junction of the Mali and the N'Mai. Its chief tributaries on the right bank are the **Mogaung** and the **Chindwin**. On the left bank the chief tributaries are the **Taping**, the **Shweli**, and the **Myitnge**. Next in importance to the Irrawaddy is the **Salwin**, which, rising in Tibet, enters British territories some 600 miles above its mouth, and falls into the Gulf of Martaban near the city of Moulmein. It is not nearly so important as the Irrawaddy, because, owing to rapids in Lower Burma and in the Shan States, it is at present unnavigable.

Between the mouths of the Irrawaddy and the Salwin, two streams flow into the Gulf of Martaban: the **Hlaing** or **Rangoon River** from the north-west, with its tributaries the Pazundaung from the north and the Pegu River from the north-east, and the **Sittang**, which drains the valley between the Pegu Yoma and the Shan Hills. Of the rivers that rise on the outer edge of the Burmese arc the most important is the **Kaladan** in Arakan, which rises in the Chin Hills and flows south into the Bay of Bengal. The **Tavoy** and the **Tenasserim** in the south are also deserving of mention.

There are numerous islands off the coast of Burma. The largest of the islands off the Arakan coast is Ramree, with the island of Cheduba to the south of it. Off the Tenasserim coast the chief islands are Bilugyun at the mouth of the Salwin, and the Mergui Archipelago farther south.

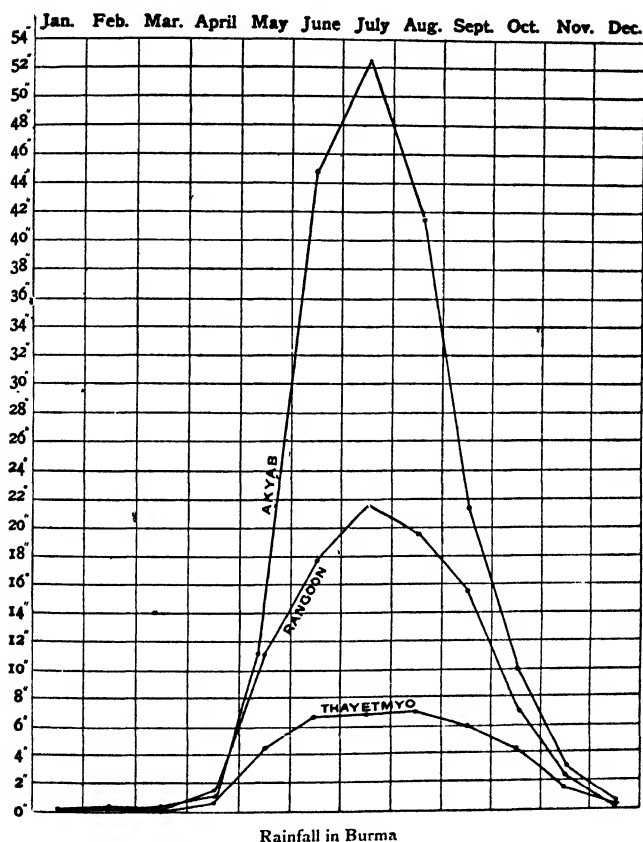
**Climate.**—Burma has long been considered a notoriously unhealthy country; but, like other tropical lands, great reductions have been made in recent years in the number of victims to malaria and other tropical diseases, and the stations inhabited by Europeans in Burma are now, as a rule, as healthy as stations elsewhere in the East.

It is true that Lower Burma is during the greater part of the year a most relaxing place to live in, though the climate is cooler and more temperate than the climate of Upper Burma, as is shown by the whiter skins and stouter bodies of the people of the district. Burma as a whole is a region of very heavy rainfall.

The lowest rainfall, even in what is spoken of as the rainless zone, is between 30 and 40 inches.

**Population, &c.**—The total population of Burma, including the Shan States, was in 1911 between 12 and 13 millions.

The chief races are the Burmese, the Arakanese, the Shans, the Chins, the Kachins, and the Karens. They speak a variety of languages, of which the chief is Burmese, used by between three-fifths and four-fifths of the people. Shan, Karen, Talaing, Chin, and



Kachin are the principal other languages in use, though besides these there are a number of other dialects spoken by the people of the country.

**Religion.**—Nearly 90 per cent of the people are Buddhists, and the pagodas and monasteries, or kyaungs, met with in every village bear witness to their religious feelings.

The great majority depend for their living on the cultivation of the soil. The artisan class numbers only about one-fifth of the total popula-

tion. It includes cotton weavers, silk weavers, tailors, goldsmiths, iron workers, potters, carpenters, and mat-makers. The commercial classes number nearly half a million, and the professional a quarter of a million. Of the professional class, by far the most numerous is that of the religious mendicant. Rice is the chief article of food of the Burman, who, however, has no hesitation in eating any kind of food used by Europeans.

Rice is grown in fully two-thirds of the area of Burma under crops, and in fully eleven-twelfths of the cropped area of Lower Burma.

The cattle are small but sturdy, and are bred mostly for draught purposes. The Burmese ponies are small but strong, and not at all good-tempered. Sheep and goats are bred to a small extent mostly by natives of India.

The forests of Burma are of very great importance, and may be classified as of two kinds, reserved and public.

The timber trees may also be classed as "reserved" and "unreserved". The reserved timber includes teak, which, wherever found, is the property of the Government, and some eighteen other kinds of tree to which this rule does not apply. Unreserved trees may, outside the Reserves, be used for domestic or other purposes free of cost. Teak is one of the most valuable of the articles exported from Burma.

Petroleum has been found in Arakan, and Tenasserim yields tin; but the mineral wealth of Burma is confined chiefly to the upper part of the province.

Coal has been found in both the northern and southern Shan States, specially near Lashio. It has been found also to the west of the Chindwin, in the Upper Chindwin District, and in Thayetmyo. Mogok is the centre of the ruby-mining area of Upper Burma, though rubies are found also in the Nanyaseik tract, and in the Mogaung township of the Myitkyina District.

The richest oil-bearing tract in Burma lies in the southern part of the dry zone. The chief oil centres are at Yenangyaung in the Magwe District, at Singu in the Myingyan District, and at Yenangyat in the Pakokku District. All these are in the valley of the Irrawaddy. Jade is quarried in the hills in the north of the country in the neighbourhood of Myitkyina, and the whole of the mineral so quarried is sent to China.

**Government.**—Burma is under the administration of a Lieutenant-Governor assisted by a Legislative Council of seventeen members, fourteen of whom are nominated, not more than six being official, and one elected, besides two extra members.

The territories under the control of the Lieutenant-Governor consist of Burma proper, the Shan States in the east, and the Chin Hills in the north. There are in Burma proper eight divisions, four in Upper and four in Lower Burma, each under a Commissioner. Each division is made up of a number of districts, and each district is under the control of a Deputy Commissioner. Districts are further broken up into subdivisions, each under a subdivisional officer, and each subdivision includes one or more townships. The village system is here, as in many other parts of the East, the basis of the administration. The headman in charge of one or more villages forming a unit small enough to be controlled by a single official, is responsible to the circle headman for the collection of revenue.

**Towns.**—**Rangoon** is the chief outlet for the commerce of the province. It exports rice, timber, cutch, hides, india-rubber, tobacco, and cotton; and imports hardware, piece goods, rock oil, salted fish, liquors, and sugar. The port of Rangoon is managed by thirteen commissioners, four of whom are chosen by the Rangoon Chamber of Commerce, and one by the Rangoon Trades Association, the others being appointed by the local government. **Moulmein** exports timber, rice, and tobacco; and imports, besides hardware, piece goods and salted fish, betelnuts and sugar. Rice is the main article of export from **Akyab** and **Bassein**. **Mergui**, in Tenasserim, exports fish and shrimp paste, dried prawns and salted fish, mother-of-pearl and tin. **Mandalay** and **Bhamo** are the two chief centres of the trade with Southern China, and Mandalay is also the head-quarters of the tea and jade trade of Upper Burma. **Myingyan** is largely concerned in the trade in cotton, which is grown, as has been said, largely in the dry zone.

## THE INDO-GANGETIC PLAIN

This plain lies between the Himalayas and the mountains of Central India. It includes, besides the border Province of Assam on the north-east, the Provinces of Bengal, of Bihar and Orissa, the United Provinces and the Punjab. It includes, in addition, **Sind**, **Rajputana**, and the north-western part of the Province of Bombay.

These provinces, of course, take in parts that belong to the Himalaya region and parts that belong to the Central Indian Hill region, but they are chiefly provinces of the Indo-Gangetic Plain.



### Assam

Assam, which lies on the north-eastern border of Bengal and has to the north of it the Eastern hill tribes and Eastern Tibet, has a total area of between sixty and seventy thousand square miles, and a population of over 7,000,000.

It is bounded on the north by the Eastern Himalayas, on the east by the southern dependent loop of young folded mountains which separate it from Burma, on the south by the Chin Hills and the state of Hill Tippera, and on the west by Bengal.

The tableland of Assam, or as it is often spoken of, the Jaintia and Khasi Hills, divides the Brahmaputra portion of the province from the Surma valley portion. The Surma valley is a flat plain, about 120 miles long and about half that breadth, drained by the Surma, which rises on the southern slopes of the Naga Hills, and flows southward through the Manipur Hills. After passing through these, it turns first northward and then westward, and divides into two branches which reunite on the western borders of Assam. It receives various tributaries both on the right bank and on the left bank. The western part of the valley is very low, and the river banks are raised by the deposits of silt above the level of the surrounding country, which during the rainy season is turned into what appears a vast lake.

The Brahmaputra valley is, like the Surma valley, a great alluvial plain. It is very narrow in comparison to its length, being nearly 500 miles long and only about a tenth of that in width. The Brahmaputra, which flows through the middle of the valley, receives numerous tributaries both from the Himalayas on the north and from the Assam Hills on the south. The river has on either side of it stretches of marshland covered with jungle, and divides and reunites in numerous places. Farther back from the river the level rises, and there is a cultivated belt covered with rice-fields and dotted with clumps of bamboos, palms, and fruit trees. In these clumps are buried the houses of the cultivators. The hill slopes are densely wooded, and the gorges through which the rivers pass, in many cases, are very beautiful.

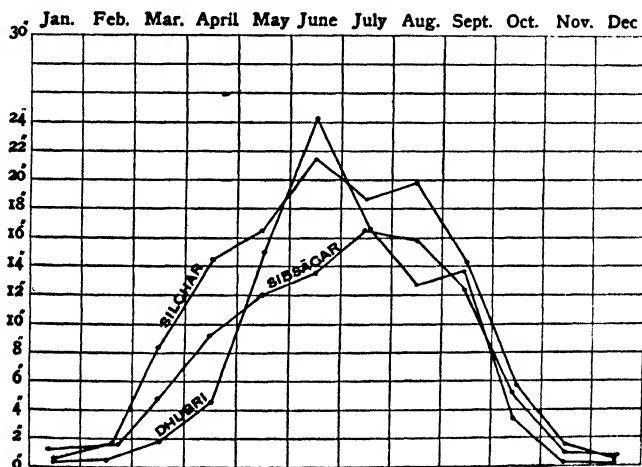
**Climate.**—The climate of the province is noted for its coolness and for its heavy rainfall. There is no hot season as there is elsewhere in India, the year in Assam consisting of a cold season and a rainy season.

**Productions.**—Commercially, tea is the most important of the productions of Assam. There are now in the province about 800 tea gardens, employing nearly 1000 Europeans and 500,000 natives. Tea is grown both in the Brahmaputra valley and in the Surma valley.

In the latter the yield is higher, but the price got is lower than in Assam proper.

In recent years the area under jute has been considerably increased in Sylhet and Lower Assam. As might be certain from the character of the soil and climate, the forests of Assam are of great importance. The Government forests are of two kinds, the "reserved" and the "un-classed". The latter is the name given to all the land, not "reserved" forest, at the disposal of the Government, though much of it carries no timber.

Even the "reserved" forests of Assam have not been thoroughly



Assam Rainfall

explored. The most valuable forests are those of **Goalpara**, at the foot of the Himalayas, where a considerable area is covered with sal. **Sal** grows also on the Garo Hills, and in Kamrup, Darrang, Nowgong, and Sylhet. The **rubber tree**, like the tea plant, is indigenous to Assam, but it was killed out by improper tapping. In recent years artificial plantations of rubber trees have been started, and rubber is likely to become one of the important exports of the province. **Lac** is collected from the forests, and is also cultivated in the Kamrup District and on the Khasi, Jaintia, and Garo Hills.

The only minerals worked on a commercial scale in the province are coal, limestone, and petroleum.

**People.**—Assam was probably first colonized by Mongolians from the tablelands of China and Tibet, but it seems to have

been occupied later, though still very early, by Hindus from the west. Hindu princes were reigning in Assam when it was overrun by a succession of Tibeto-Burman tribes, who made themselves masters of the region.

From the thirteenth century onwards the **Ahoms**, a Shan tribe, were the rulers of the land. They acquired considerable power, and were able to repulse the attacks of Muhammadan invaders.

Of the total population of Assam more than half are Hindus in religion, and of these more than half are followers of Vishnu. About one-fourth of the total population of the province are Muhammadans, while the religion of one-sixth can be best described as animistic.

The two main languages of the province are Bengali, which is spoken by nearly half the people, and Assamese, which is used by rather less than one-fourth. In addition to these there are a great many other languages belonging to the Tibeto-Burman stock, and spoken by tribes in different parts of the province.

**Government.**—The Chief Commissioner, who acts immediately under the orders of the Government of India, is the virtual ruler of the province. For the administration of affairs he is aided by a staff consisting of the Assam Commission, the Assam Provincial Civil Service, and the subordinate Civil Service.

In Assam, as elsewhere in India, the administrative unit is the district. There are two divisions of the province, and each of these consists of six districts. Ten of the twelve districts are further divided into subdivisions, of which there are in all twenty-seven.

The District Magistrate has direct charge of the head-quarters subdivision, and a magistrate, usually a European, is put in charge of each of the outlying subdivisions.

The smallest administrative unit in Assam is the Mauza, which is under the control of an officer, the Mauzadar, who contracts to pay the revenue. The Mauzadari system is popular with the natives, and has been retained on that account.

**Towns.**—The population of Assam is almost entirely rural, and there are no large towns. **Shillong**, the capital, has a population of less than 15,000, but the small Assamese towns often cover a very large area, including what might be reckoned as semi-urban and even rural parts.

**Sylhet**, **Gauhati**, and **Dibrugarh** are, besides Shillong, the only towns in the province with a population of over 10,000.

### Manipur

This native state consists of a valley about 30 miles long by 20 miles wide, shut in on every side by hills. These hills are part of the south-hanging eastern arc of the Alpine Himalayan system, and in the north of the state reach a height of over 13,000 feet. The hills consist for the most part of forest-clad parallel ridges rising here and there into conical peaks, and separated from each other by deep river valleys.

The valley itself and the hills that border it on the east are drained by streams which ultimately, under the name of the Manipur River, find their way into the Chindwin and thence into the Irrawaddy.

**Climate, &c.**—The Manipur valley lies at a height of between 2000 and 3000 feet above sea-level, and enjoys a cool and pleasant climate. Wild animals are fairly plentiful, and include elephants, tigers, leopards, bears, deer, and wild pigs. Large flocks of geese and ducks are to be met with on **Lake Loktak**, which has numerous floating islands towards its southern end.

The cattle of Manipur are hardy little animals, for which there is a considerable demand outside of the state. The Manipuri ponies are noted for their endurance and speed. It is said that the game of polo originated in Manipur several centuries ago.

The valley and the hills round it have not yet been explored, so it is not possible to speak with certainty of its mineral resources, but it does not seem at all likely that these will be found to be great.

The principal article of export from the state is rice, though cattle and buffaloes are also exported in considerable numbers. Oil and betel-nuts, dried fish, salt, and cotton piece goods form the chief imports.

**Government, &c.**—The country is under the rule of the Raja, H. H. Chura Chand Singh. During his minority it was administered by a Political Agent, who was assisted by a junior member of the Assam Commission.

The medical officer of the regiment at Manipur acts as a civil surgeon, and public works are carried out by the state engineer. The Raja is assisted by a Darbar, the vice-president of which is a member of the Indian Civil Service.

**Imphal** is the capital, and is connected by a fairly good road to Dimapur on the Assam-Bengal Railway.

### Presidency of Bengal

**Position, Boundaries, &c.**—The present Presidency of Bengal was formed on 1st April, 1912. It consists almost entirely of a vast alluvial plain, intersected in all directions by rivers, creeks, and channels. It stretches southward from the foot of the Himalayas in an unbroken and exceedingly fertile and cultivated expanse, till it meets the jungle tract of forests, creeks, and swamps to which the name Sundarbans has been given, and which separates the cultivated area from the Bay of Bengal.

It has an area which may be taken roughly at 80,000 square miles, and a population of between forty-five and fifty millions, giving an average density of population for the whole of the area of close on 600 per square mile. In other words, it is one of the most densely-peopled tracts on the earth's surface. It is bounded on the east by Burma and Assam, on the south by the Bay of Bengal, on the west by the new province of Bihar and Orissa, and on the north by Bhutan.

**Surface.**—The province consists very largely of the vast alluvial plain which forms the delta of the two great rivers, the Ganges and the Brahmaputra.

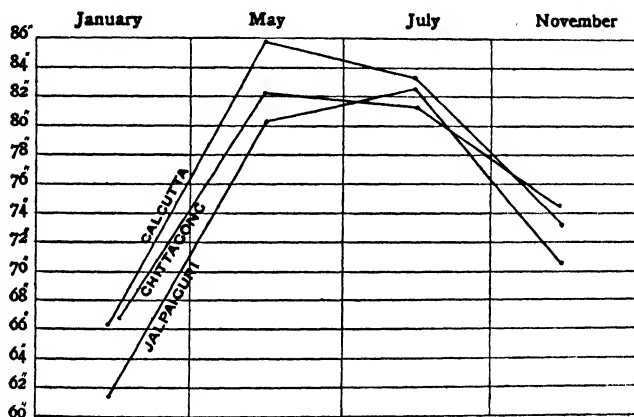
The south-western part may be regarded as belonging to the Ganges basin, and the northern and eastern part to that of the Brahmaputra. The Mahananda and Atrai join the Ganges on the left, but the Karatoya and Tista, two other important rivers that flow through the northern part of the Presidency, join the Brahmaputra on the right bank. In a vast level country like the Presidency of Bengal, when the rainfall is heavy the rivers that descend from the mountains bring down great quantities of silt, which is spread over the fields and fertilizes them; but which also fills up their channels and forces them constantly to change their course.

Notwithstanding the dead level of the greater part of the country the scenery of Bengal is generally distinctly pleasing. Even during the dry season the groves of bamboos, of mangoes, areca and coco-nut palm, and of tamarind, pipal, and other trees in which the homesteads of the people are buried, show a profusion of greenery very grateful to the eye. During the rainy season the delicate green of the rice seedlings, and in the harvest the golden heads of the ripe plants, add greatly to the beauty of the landscape.

Everywhere the coast of the Bay of Bengal is low, and the harbours are of necessity situated some distance up the rivers. **Calcutta**, the chief port of India, with imports and exports

approaching to 100 millions sterling annually, is 80 miles from the mouth of the Hooghly; and Chittagong, on the east side of the bay, the outlet for the trade of Assam, is 12 miles from the mouth of the Karnaphuli River.

**Climate.**—Although only the southern portion of Bengal is within the Tropics, the climate of the province during the



Temperature, Bengal

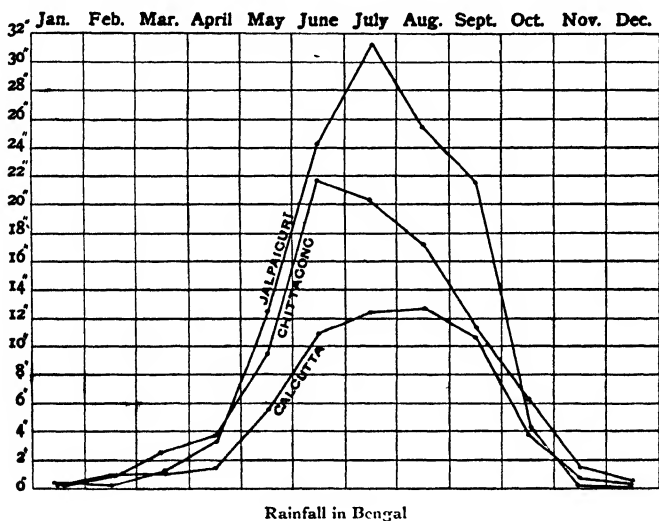
greater part of the year can only be described as tropical. It is very warm and very moist, and has two seasons only, a wet and a dry. The average temperature throughout the year lies, it will be seen from the graphs, between 60° F. and 86° F.

The rainfall is as a rule plentiful, but is subject to great variations; sometimes the deficiency is very considerable. The variation is greatest in the north of the province, and decreases towards the south and towards the east. Excessive local precipitations sometimes occur, causing floods and landslips.

The constant deposition of matter at the mouths of the great rivers is silting up the northern portion of the Bay of Bengal, and is also causing a depression of that portion of the earth's crust. This makes the province an earthquake region, where small earth tremors are of constant occurrence and there are violent shocks from time to time.

**People.**—The people seem to belong to three distinct stocks, the Dravidian, the Tibeto-Burman, and the Aryan. The main basis of the race is Dravidian, though on the east and north especially there is a very strong Mongolian element, while all through there is a considerable infusion of Aryan blood.

Of the total population of Bengal nearly 53 per cent are Muhammadans and nearly 45 per cent are Hindus; Animists, Buddhists,



and Christians constitute the remaining 2 per cent of the population. The Muhammadans of Bengal are mostly Sunnis. They are the most prosperous, most progressive, and most loyal portion of the population.

**Government.**—The Presidency is under a Governor, assisted by an Executive Council of three members, and a Legislative Council of fifty members, of whom twenty-two are nominated, not more than seventeen being officials, and twenty-six are elected. The Presidency consists of five Divisions. These are **Burdwan**, **Chittagong**, **Rajshahi**, **Dacca**, and what is called **The Presidency**. Each division is under a Commissioner, and is in turn

divided into districts, each under a District Officer or Deputy Commissioner.

There are twenty-eight of these districts, the number in the division ranging from four to seven. The most northern is the Darjeeling District to the south of Sikkim. The district belongs partly to the Himalayan region and partly to the plains. The scenery is remarkably beautiful, and tea-growing is the staple industry. Darjeeling town, the head-quarters of the district, has a population of about 20,000, and is the summer head-quarters of the Governor of Bengal. During the summer months the population is very considerably increased.

The districts are usually broken up into two or more subdivisions, the head-quarters subdivision being under the District Magistrate, and each of the others under a subordinate officer known as a Joint, an Assistant, or a Deputy Magistrate.

**Towns.**—The most important cities in Bengal are **Calcutta**, on the Hooghly, with a population of over a million and a quarter; **Dacca**, the capital of the Dacca Division, an important manufacturing town and trading centre, with a population of over 100,000; **Howrah**, on the right bank of the Ganges, a suburb of Calcutta, with a population of nearly 200,000. **Murshidabad**, on the right bank of the Ganges, though of considerable historic interest, is a decaying place which shows few signs of its former greatness. Its population is now under 20,000. **Burdwan**, on the Banka river, has cutlery manufactures.

### Cooch Behar

The feudatory state of Cooch Behar lies at the foot of the Himalayas between Rangpur District and the Jalpaiguri Duars.

It is a low-lying alluvial plain intersected by several large rivers which find their way into the Brahmaputra, but are of no use for drainage purposes except in the cold season, when they are at their lowest. The most important of these are the **Tista** on the west, the **Singimari** in the centre, and the **Gadadhar** on the east. The state has an area of about 1300 square miles.

**People and Government.**—The people are mainly Mongolian, the Kochs or Rajbansis being either pure Kochs though dark, or of a mixed Mongolo-Dravidian breed in which the Koch is the chief element.

For administrative purposes the state is divided into five areas, and at the head of the whole state is the State Council,



of which His Highness the Maharaja is president, and the Superintendent of the state is vice-president.

The Superintendent, an officer lent by the Government of India, is the head of the legal administration, the police, education, public works, and minor other state departments. The Diwan, the third member of the State Council, is responsible for the collection of all kinds of revenue and for the management of all matters connected therewith. The fourth member of the State Council is the Civil Sessions Judge, who exercises all the powers vested in a Sessions Judge according to the provisions of the Criminal Procedure Code.

**The Town of Cooch Behar**, the capital of the state, is connected by the Cooch Behar State Railway with the Eastern Bengal system.

### Hill Tippera

This native state in Bengal is bounded on the east by the Chittagong hill tracts and the Lushai Hills, on the north by the District of Sylhet in Assam, on the west by the Tippera District and Noakhali District, and on the south by Noakhali District, Chittagong District, and the Chittagong hill tracts. It has an area of a little over 4000 square miles, and a population of about 200,000.

**People and Government.**—The people are Tibeto-Burman or Mongolian, and appear closely akin to the Murungs of Arakan. Their religion seems a curious mixture of Hinduism and Animism.

There are seven administrative divisions, each under an officer called a Magistrate Collector. The Raja is the owner of the soil and the ruler of the state, the laws of which are modelled on those of British India. The Magistrate of the Tippera District is *ex-officio* Political Agent for the Hill Tippera State. **Agartala** is the capital of the State.

### Bihar and Orissa

The new province of Bihar and Orissa, which includes the three great sub-provinces of Bihar, Orissa, and Chota-Nagpur, stretches from Nepal and the Himalayas to the Bay of Bengal.

It was formed on 1st April, 1912, from the Orissa, Chota-Nagpur, Tirhut, and Patna divisions, and from part of the Bhagalpur Division. It consists of regions in which the people differ widely in language and in character.

It is bounded on the east by Bengal and the Bay of Bengal, on the north by Nepal, on the west by Oudh, Central India, and the Central Provinces, and on the south by Madras (the Northern Sirkars), and the Bay of Bengal.

It has an area of between 80,000 and 90,000 square miles and a population of about 40,000,000.

**Surface.**—Besides the alluvial plain of Bihar, broken in two by the Ganges, and consisting chiefly of old alluvium, not fertilized as in the case of Bengal by annual deposits of silt, the province consists of the gneissic plateau of Chota-Nagpur with an area of over 40,000 square miles, and of Orissa, a coastal alluvial plain with an area of between 20,000 and 30,000 square miles.

Bihar is in its northern part a level plain falling gently from the Himalayas, and having a belt of high ground along the left bank of the Ganges. On the south of the Ganges the effects of recent river action are not nearly so manifest. There, however, the Ganges receives on its right bank the **Son** from **Chota-Nagpur**, and nearer its mouth, the **Damodar** and **Rupnarayan** fall into its western branch, the Hooghly. Farther south a number of the rivers that drain the Chota-Nagpur plateau find their way into the sea. The principal of these are the **Subarnarekha**, the **Brahmani**, and the **Mahanadi**.

The largest body of water in the province is **Lake Chilka** in the south, a shallow inland gulf with an area of between 400 and 500 square miles, separated from the Bay of Bengal by a long narrow sandy ridge, and walled in on the west and south by high hills.

**Climate, &c.**—Bihar, the northern part of the province, is colder in winter and hotter in summer, and has a lighter rainfall than Bengal. This, of course, is in accordance with the rule that greater extremes of climate occur as we go inland. The annual rainfall averages from 60 to 70 inches in the coast districts, though in places it is over 80 inches.

In Chota-Nagpur it ranges on an average from 45 to 50 inches, in South Bihar it is only a little over 40 inches. In the sub-montane parts of North Bihar it averages from 50 to 55 inches. It fluctuates, however, very greatly, and the fluctuations are very irregular, though they may be said to decrease as we proceed from north to south.

The average temperature ranges from about 60° to 90°, though extremes of over 100° are often registered. From

November to February the weather is fine and dry, and there is almost complete absence of rainfall and cloud.

The soil of Bihar and Orissa is either old alluvium or sedentary soil from the old, hard underlying rocks. The latter is met with in the Chota-Nagpur plateau and in parts of the neighbouring districts. As a rule, where the soil is old alluvium the surface is broken by the denuding action of the rivers, and falls into a series of ridges parallel to the river courses. To fit the undulating surface thus produced for rice, a system of terraces and embankments have to be formed to hold up the rain-water; and where this is too costly, a crop that does not need so much water has to take the place of the rice.

**Government.**—Bihār and Orissa is under a Lieutenant-Governor, who is assisted by an Executive Council of three members. There is also a Provincial Legislative Council, the members of which are partly elected and partly nominated.

For administrative purposes the province is divided into four divisions: Patna and Bhagalpur, which make up the sub-province of Bihar, Chota-Nagpur, and Orissa, each of which is under a separate Commissioner.

The Commissioner exercises a general control over the management of affairs within his division. His business is to see that the local officers duly perform the duties entrusted to them and carry into effect the orders issued by the Government. Local officers apply to him for instructions, and he refers to the Central Government all matters with which he does not feel himself competent to deal.

**Towns, &c.**—The most important places in the Bihar sub-province are: **Patna**, which is identified with Pātaliputra, the capital of the kingdom of Asoka. It is now the largest city in the province, the head-quarters of the Commissioner, and the Additional Commissioner.

**Gaya**, the head-quarters of the Gaya District, is a place of pilgrimage visited yearly by thousands of Hindus from every part of India. The Vishnupada, a temple built over the footprint of Vishnu on the solid rock, may be looked on as the centre of the pilgrimage. It contains the impress of the "god's" foot, which is surrounded by an octagonal basin plated with silver. The Gayawal are the hereditary officiating priests, whose blessing makes the pilgrimage effectual. Gaya has a population of less than 100,000.

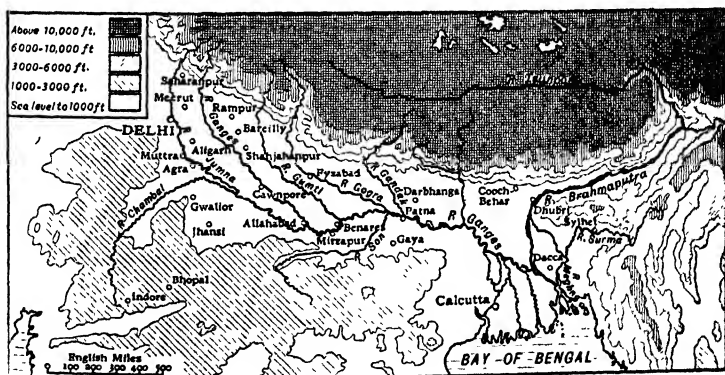
**Bihār** is historically a very important town, with remains of Buddhist and Brahmanical buildings, of Muhammadan mosques and tombs. It has a population of less than 50,000.

**Rānchi**, the head-quarters of the Chota-Nagpur Division, and one of the chief towns on the Central plateau, has a population of nearly 30,000.

Other important towns are **Monghyr**, **Muzaffarpur**, **Chapra**, **Darbhanga**, and **Bhagalpur**. The area of the states connected with Bihar and Orissa is nearly 30,000 square miles, and their population is about 4,000,000. These states, however, lie chiefly in the Central Indian Region, and will be there discussed.

### The United Provinces

The United Provinces of Agra and Oudh lie between  $23^{\circ} 52'$  and  $31^{\circ} 18' N.$ , and  $77^{\circ} 3'$  and  $84^{\circ} 39' E.$  They are



The Basins of the Ganges and Brahmaputra

bounded on the north by Tibet, on the north-east by Nepal, on the east by Bihar and Orissa, on the south by some of the Chota-Nagpur states and some of the states of the Central India Agency, and on the west and north-west by Gwalior, Dholpur, and Bharatpur, by the chief Commissionership of Delhi and by the Punjab. The united area of the two provinces is nearly 110,000 square miles, and the population over 47,000,000.

Agra has an area of over 80,000 square miles, and Oudh alone an area of nearly 25,000.

The United Provinces include portions of the Himalayas, the sub-Himalayan tracts, the great plain of Northern India, and the hill country of Central India. The Himalayan tract in the extreme north includes the districts Dehra Dun, Garwhal, Almora, and Naini Tal. These have already been described under the Himalayan region.

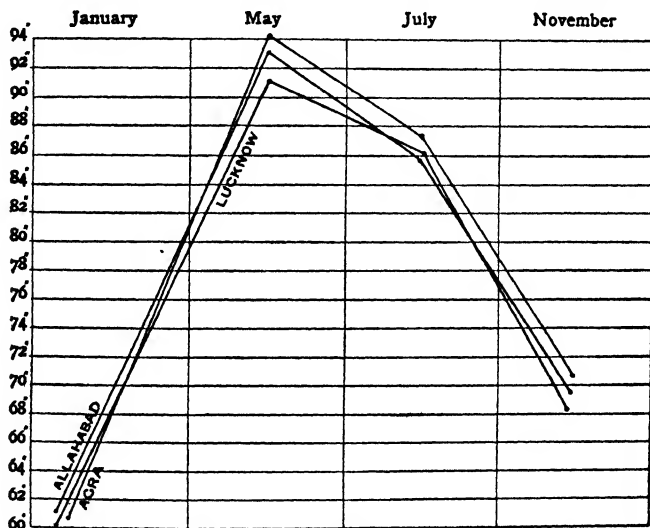
In the sub-montane tract between the Ganges in the west and the Sarda tributary of the Gogra on the east there is first a strip of land some 20 miles wide in the west and narrowing towards the east. It is called the **Bhabar**, and into it the torrents from the mountains sink and are lost under a mass of boulders and gravel save during the rainy season. Most of the Bhabar is covered with forests which are the home of tigers, elephants, and other large game. Below the Bhabar is the **Tarai**, a marshy tract covered with thick jungle and tall grass. In both of these tracts the population is migratory, coming from the hills and from the plains and leaving the districts when their crops are cut.

The climate of the Tarai is most unhealthy. Other tracts, particularly in the north, are like the Tarai; they slope from the hills, have an excessively heavy rainfall, and are watered by numerous streams. The area of this sub-montane region of the United Provinces is not much less than one-fourth of the whole area. Fully half the area of the United Provinces, about 54,000 square miles, is included in the Indo-Gangetic Plain. In the north-western part of the provinces there are a number of districts situated for the most part in the Doab, that is in the land between the Jumna and the Ganges, and forming a gently-sloping plain, in which neither rock nor stone approaches the surface, and many of which are provided with irrigation works. These districts in the Meerut, Bareilly, and Agra Divisions are by far the most prosperous in the province.

The **Bareilly Division** lies between the Ganges and the Sarda, and the **Lucknow Division** and **Fyzabad Division** of Oudh lie between the Ganges and the Gogra, and are drained by the Gumti. The **Allahabad Division** lies partly in the Doab and partly to the south of the Jumna, and embraces the Districts of Jalaun, Banda and Hamirpur, and Jhansi, which form part of Central India and are known as British Bundelkhand. The **Benares Division** also includes districts to the south of the Ganges as well as districts between the Ganges and the Gogra, while the **Gorakhpur Division** includes districts on both sides of the Gogra, those to the north being drained by the Rapti and the Little Gandak.

The Ganges roughly divides the United Provinces into two parts, the part to the east and north being nearly double the size of the part to the west and south of that river. The part to the west and south consists of the Doab, or land between the Ganges and the Jumna, and of the land to the south-west of the Jumna.

**Climate and Soil.**—The climate of the United Provinces is more continental than the climate of Bengal or of Bihar and,



Annual Temperatures, United Provinces

Orissa. It is colder in January and warmer in May than in either of these provinces, and the daily range of temperature at all seasons of the year is much greater, running from  $11^{\circ}$  to  $15^{\circ}$  in July, when it is lowest, to over twice that in November.

May is the hottest season of the year, the average temperature then being between  $90^{\circ}$  and  $100^{\circ}$  F., with an average daily range of between  $20^{\circ}$  and  $30^{\circ}$  F.

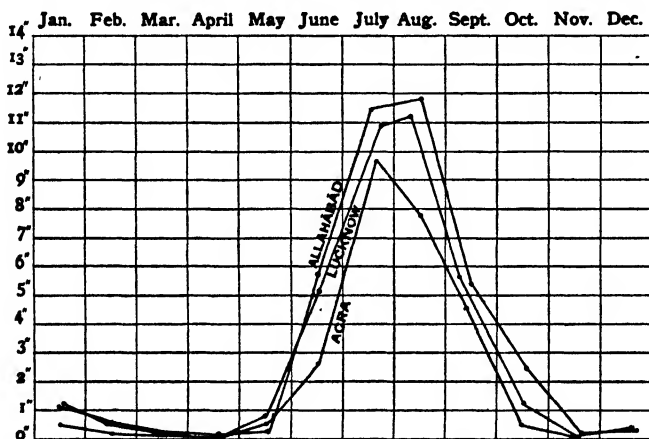
Over the whole of the United Provinces the monsoon begins in June, and the rainfall is heaviest in July and August, but the air remains saturated till the beginning of October.

From March to the end of May, as will be seen by examining the temperature and rainfall graphs, the rainfall is very slight and the

temperature very high. May, and not July as is the case in most parts of the Northern Hemisphere, is the hottest month.

In the drier parts of the great plain the fertility of the soil is lessened by an efflorescence of carbonate or sulphate of soda, often mixed with common salt. This is commonly called "reh".

The soils have been classified as valley soils of the Himalayas, alluvial soils of the great plain, and alluvial soils of Central India. In the Himalayas the soils are of local origin or sedentary, and there are small patches of cultivation in the valleys and on the hillsides. The soils of the great plain have mainly been brought down by the



Annual Rainfall, United Provinces

rivers from the Himalayas, and the difference in their chemical composition is often slight.

**Government.**—The province is under a Lieutenant-Governor, assisted by a staff of five secretaries and five under-secretaries. Three of the secretaries must be members of the Indian Civil Service, and the chief secretary has charge of the Revenue Department, the General Administration, the Political and the Forest Departments. The other two secretaries belong to the Public Works Department.

The Board of Revenue fixes and controls the assessment and collection of land tenure, income tax, stamps, and excise.

There is a **Legislative Council** for the province which, under the

Indian Councils Act, consists of forty-eight members. Of these twenty-six are nominated, but not more than twenty of the twenty-six can be officials, and twenty are elected. There are in addition two extra members.

There are in the United Provinces forty-eight districts. Thirty-six of these are in the Province of Agra, and twelve in the Province of Oudh.

The average size of a district is about 2200 square miles, and the average population is roughly one million.

Each district is under a District Officer, who is called Collector and Magistrate in the Province of Agra, and Deputy Commissioner and Magistrate in Kumaun Division and in Oudh. The most important subdivision of a district is the tahsil. Of these there are 217 in the province, with an average area of 500 square miles, and a population each on the average of a quarter of a million. Each tahsil is in charge of a tahsildār, who is responsible for the revenue collection, and exercises to a certain extent judicial powers. Under the tahsils are the supervisors, whose duty it is to overlook the work of the village accountants or patwaris, and to check their papers.

The village forms a small self-governing community to which watchmen, barbers, sweepers, carpenters, and potters are servants. Land revenue and irrigation charges are collected in all but the eastern districts by the *lambardar*, who is chosen by the subdivisional officer after being nominated by the whole of those interested. Headmen, whose duty it is to report crimes, are generally chosen from the *lambardars*, and there is a headman in every large village and large hamlet. The headman, it must be remembered, has nominally no power of any kind.

The High Court in Agra and the Court of the Judicial Commissioner in Oudh are the final courts of appeal in the United Provinces.

The ordinary Civil Courts in the province are those of the Munsifs, and of these there are sixty-eight in Agra and twenty-five in Oudh.

The Stipendiary Magistrates include Tahsildars, and Deputy-, Assistant-, Joint-, and District Magistrates. In large towns there are benches of Honorary Magistrates.

### Towns

**Allahabad**, in the peninsula formed at the meeting-place of the Jumna and Ganges, is regarded as the capital of the United Provinces of Agra and Oudh. The fort at the South East of the peninsula is at the junction of the rivers. From its position also at the junction of a number of railway systems, Allahabad is one of the chief trading



centres of the great plain. It is the great cotton market, and is famous for its fairs. It has a population of over 150,000.

**Lucknow**, the former capital of the Province of Oudh and the largest city in the United Provinces, has still a population of over a quarter of a million. The people are about three-fifths Muhammadans and two-fifths Hindus.

**Benares**, on the north bank of the Ganges, the capital of the district of the same name, is one of the oldest and most famous cities in the East. It is the religious capital of the Hindus, and a holy place alike to Hindus and Buddhists. It has a population of over 200,000, and is noted for its silks, its gold-embroidered stuffs, its shawls, wooden toys, and brass and lacquered wares.

**Cawnpore**, on the south bank of the Ganges, is a great commercial and railway centre, and is noted for its manufacture of cotton, of leather goods, and jewellery. It was in July, 1857, the scene of the massacre of Europeans—men, women, and children—by Nana Sahib. Its population is close on 200,000.

**Agra**, on the right bank of the river Jumna, is an important commercial centre dealing in cotton, grain, tobacco, salt, indigo, and sugar. It was for a time the capital of the *Mogul* Empire, and though its streets are, as a rule, extremely narrow, it contains some splendid buildings. The most famous of these is the Taj Mahal. This mausoleum was built by Shah Jahan in the seventeenth century in memory of his favourite queen. It is of white marble, and is one of the finest buildings, not merely in India, but in the world. The Moti Masjid, or "Pearl Mosque", another of the buildings of Agra, rivals in beauty the Taj.

**Bareilly** stands on a plateau above the Ramganga, and is an important trading centre. Its chief industry is sugar-refining, but it is also noted for its furniture manufacture, both of bamboo and ordinary timber. Its manufactures of cloth and of brass vessels are not important.

**Meerut**, the capital of the division and of the district of the same name, is the seventh largest city in the United Provinces. The place seems a very old one, and though the streets seem generally mean and are badly arranged, there are some very interesting monuments in Meerut. Among these may be mentioned the mausoleum erected by Kutb-ud-din in 1194; the Jama Masjid, said to have been built in the beginning of the eleventh century; and the mausoleum erected early in the seventeenth century by Nur Jahan in memory of the Fakir Shah Pir.

**Mirzapur**, on the right bank of the Ganges, to the south-west of Benares, has declined in importance as a commercial centre owing to the extension of railways and the consequent decrease of river traffic. It is the seat of the largest brass industry in the United Provinces, and has important woollen carpet factories and a cotton-spinning mill. It has a population of nearly 80,000.

**Rampur**, about the same size as Mirzapur, is situated on the left bank of the Kosi. It is the capital of Rampur State, and has manufactures of damasks, pottery, cutlery, and sword-blades.

**Shahjahanpur**, in the centre of the plain, has between seventy and eighty thousand inhabitants, and is the centre of the sugar-refining industry.

**Moradabad**, on a ridge forming the right bank of the Ranganga, was named after the ill-fated Murad Bakhsh, the son of the Emperor Shah Jahan. The Jama Masjid, or chief mosque, is a handsome building erected by the city's founder, Rustam Khan, in 1631. Its chief manufacture is brassware, some of which is highly ornamental. Cotton also is woven, and there is some calico-printing done.

**Fyzabad**, with **Ajodhya**, on the right bank of the Gogra, is an important centre of sugar-refining. It has also a considerable trade in agricultural produce and imported goods.

**Aligarh**, **Furukhabad**, **Saharanpur**, **Gorakhpur**, **Muttra**, and **Jhansi** are all important towns, each with more than 50,000 inhabitants.

### Rampur State

**Position, &c.**—Unlike Tehri, which is part of the Himalayan region, the Rampur State, also under the superintendence of the Government of the United Provinces, is a fertile and level tract of country in the middle of the plain.

It has to the north of it the Naini Tal District, to the east the Bareilly District, to the south the District of Budaun, and to the west the Moradabad District. Numerous streams cross the state, which has an area of a little less than 1000 square miles, and a population of a little over half a million.

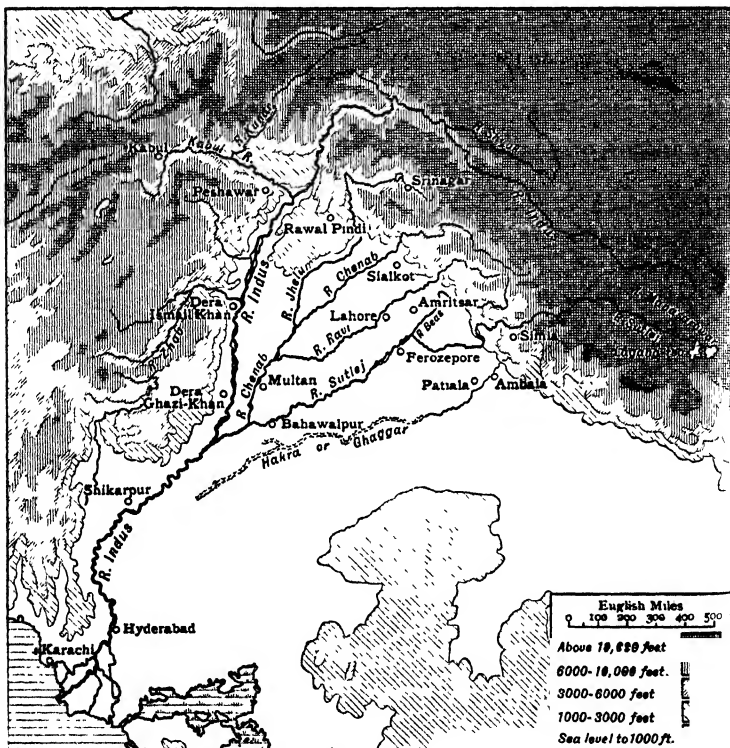
**Climate, &c.**—The north of the state is malarious, otherwise the climate is like that of the surrounding districts of the United Provinces. Rice is the chief crop from the heavy clay soil of the north of the state; but maize is the crop most largely grown, and, next to maize, wheat. Game is fairly abundant, including leopards and tigers, as well as hogs, antelopes, hares, partridges, &c. The cattle and ponies are of an inferior breed, but the state is noted for its breed of hounds.

**Government, &c.**—The Commissioner of the Bareilly Division is the Political Agent to the Lieutenant-Governor of the United Provinces for the Rampur State. The Nawab of Rampur has another adviser, a native official of the United Provinces, who is known as the Minister, and who presides over a legislative committee composed of members of the ruling family, officials, and leading residents of Rampur city.

Sentences of life imprisonment or of death require the sanction of

the Nawab, to whom there is an appeal both in civil and in criminal cases.

In Rampur there is an Arabic College which draws pupils from all parts of India and even from Central Asia, though the state as a whole is backward educationally.



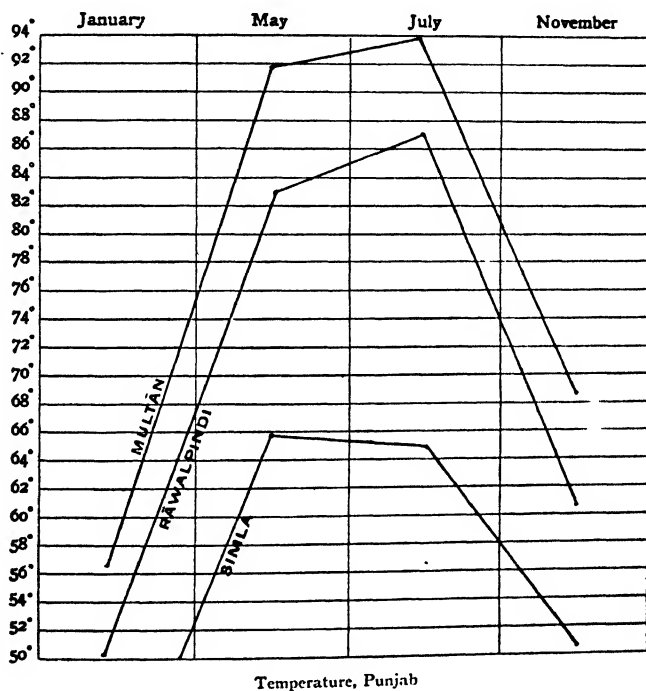
Indus Basin

### The Punjab

The Punjab is strictly the land of the five rivers, that is, the land enclosed and watered by the Jhelum, Chenab, Ravi, Beas, and Sutlej; but the province includes in addition the tableland of Sirhind between the Sutlej and the Jumna, the Sind Sagar

Doab between the Jhelum and the Indus, and Dera Ghazi Khan and a small part of the Mianwali District to the west of the Indus.

Including the native states, it has an area of roughly 135,000 square miles, of which fully more than the odd 35,000 belongs to the native



states. The population, which decreased a little between 1901 and 1911, we may take to be in round numbers 25,000,000, or a little more than half that of the United Provinces. Five of the twenty-five millions are in the native states.

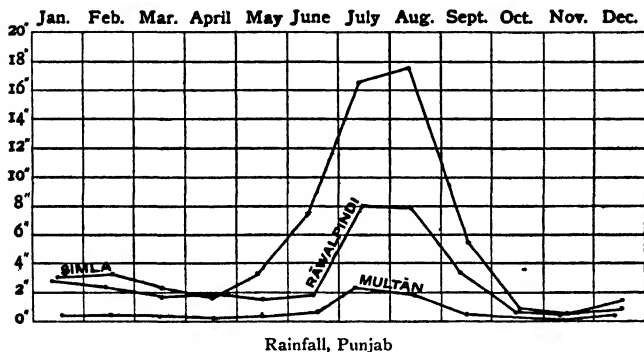
The province itself may be said to have an area of roughly 100,000 square miles, about a third more than the area of the Presidency of Bengal, and a twelfth less than that of the United

**Provinces;** and its population, 20,000,000, is considerably less than half the population of either of these provinces.

The Punjab has to the west of it Baluchistan and the North-west Frontier Province; in the north it is separated from Kashmir and Tibet by the Himalayas; the Tons and the Jumna divide it on the east from the United Provinces, and it has to the south of it the Rajputana Desert, and to the south-west of it Sind.

The province lies between  $27^{\circ}$  and  $34^{\circ} 2'$  N., and between  $69^{\circ} 23'$  and  $79^{\circ} 2'$  E. It comprises five doabs, that is, tracts of land each lying between two rivers.

These doabs were, it is said, named by the Emperor Akbar, who made their names by combining the first letters of the names of the



rivers between which they lie. They are: the Bist Jullundur, the Bari, the Rechna, the Chindhath, also called the Chaj, and the Sind Sagar Doabs. The Sind Sagar Doab lies between the Jhelum and the Indus.

**Climate.**—The climate of the Punjab is of a continental kind, that is, both the seasonal and the diurnal ranges of temperature are large. At nearly all stations in the Punjab there are two fairly marked rainy seasons: a winter season in December, January, and February, and a summer season in June, July, August, and September.

In the general discussion of the climate of India these have been explained and accounted for. The north-west winds which blow from the Mediterranean and the Caspian have still some moisture for the Punjab, though with respect to these winds the Punjab is in the rain shadow of the Hindu Kush and Koh-i-Safed. The rainfall is naturally

highest in the mountains, and may be said to decrease as we go from north to south and also as we go from east to west. The west and south-west of the province is an arid region with a low rainfall and a very high temperature.

In this region the night temperature in January and February often falls below the freezing-point, while the day temperature is sometimes over 75° F. In June the night temperature averages fully 80° F., while during the day the thermometer often reaches more than 120° F. In December the cold-season storms or cyclones set in. These are usually accompanied by very rapid changes in the weather, and follow each other at intervals averaging about ten days.

From February to May the average temperature increases rapidly, the increase being at the rate of about 10° per month. From April to near the end of June, except on the hill stations, there is no rain, and a scorching west wind blows during the day.

The monsoon rains which set in towards the end of June are not continuous; often a heavy rainfall for several days is followed by an interval of exceedingly hot and sultry weather, when there is no rain or only an occasional shower. Hailstones are not uncommon in March and April, and often do great harm to the crop. Though crossed by so many rivers that rise among the mountains and are fed by the melting snow in summer, the Punjab cannot be said, save in the extreme south-west, to suffer greatly from inundation; but inundations do occasionally occur, as was the case in the great Indus floods of 1878.

The province, moreover, suffers severely from earthquake disturbances. These occur chiefly in the region at the foot of the Himalayas. It is said that in the Kangra earthquake of 1905 at least 20,000 people perished.

**Government.**—The affairs of the Punjab are under the control of a Lieutenant-Governor, who is assisted by a Legislative Council of twenty-six members, nineteen nominated (of whom not more than ten are official), five elected, and two expert members.

The **Secretariat** through which the Lieutenant-Governor administers affairs consists of a chief secretary, a secretary, and two under-secretaries—all, as a rule, members of the Indian Civil Service. The principal heads of departments in the Punjab are the Financial Commissioner, the Director of Public Instruction, the Inspector-General of Prisons, the Inspector-General of Civil Hospitals, the Sanitary Commissioner, the Conservator of Forests, the Accountant-General, and the Postmaster-General.

The territories under the control of the Lieutenant-Governor consist

of five divisions, each under a Commissioner. These include twenty-nine districts, each of which is in charge of a Deputy-Commissioner who is subordinate to the Commissioner in charge of the division.

The districts are further subdivided into tahsils or sub-collectorates, each under a tahsildār. The number of tahsils in a district varies from three to seven. The tahsildār has under him from two to five field Kanungos, and each of these superintends from twenty to thirty patwaris, or revenue accountants, each in charge of the revenue records of a group of villages. Each village has one or more headmen, who collect the revenue, and one or more chaukidars or watchmen. The district staff includes a district judge, whose duties are almost entirely civil, though he is usually also invested with magisterial powers.

### Towns

The chief city of the Punjab is **Lahore**, on the Ravi, at the junction of a number of important railway lines. The manufactures of the city include textiles, carpets, pottery, arms, gold and silver wares. There are great railway workshops, and the city is also the seat of the Punjab University and a variety of other educational institutions. The town contains the palace of the Sikh sovereigns of the Punjab. Its present population is nearly a quarter of a million.

**Amritsar**, in the Bari doab, 33 miles east of Lahore, is the holy city of the Sikhs, and possesses a sacred temple, built in 1581 by Ram Das. It contains also the great fortress of Govindgarh built by Ranjit Singh. Shawls, silks, woollen and cotton cloths are the staple manufactures.

**Multan**, with a population of close on 100,000, lies near the left bank of the Chenab, more than 160 miles south-west of Lahore. It is an important railway centre, and manufactures various kinds of textiles.

**Rawal Pindi** is quite a modern growth. It is now the most important of the army cantonments in India. It was here that the Sikh army finally laid down its arms.

**Ambala**, though a busy trading centre noted for its cotton and grain markets, is also an important military station.

**Jullundur** is a very old city, and was formerly the capital of a Rajput kingdom. It has silk manufactures, and produces excellent carpenter work.

**Sialkot**, near the borders of Kashmir, north of Lahore, is a thriving industrial and commercial town. It contains the shrine of the Gurū Baba Nanak, the founder of the Sikh religion.

During the hot season the government resides at **Simla**, which, though the seat of the Imperial Government during half the year, is a portion of the Punjab.

## Native States

The native states under the control of the Lieutenant-Governor of the Punjab are forty-three in number, and have an area of 36,551 square miles, and a population of a little over four millions.

Some of the states are very small. **Pataudi** has an area of only about 50 square miles, and a population of a little over 20,000; while **Bahawalpur**, the largest, has an area of 15,000 square miles; and **Patiala**, the most populous, with little more than a third of the area of Bahawalpur, has a population of over a million and a half, a population twice as great as that of Bahawalpur.

Chamba, Suket, Mandi, the Simla Hill States, and Sirmur have already been dealt with as parts of the Northern Mountain region.

**Patiala**, the most populous and the most wealthy, and next to Bahawalpur the largest of the native states under the Lieutenant-Governor of the Punjab, lies in the part of the Indo-Gangetic Plain between the Jumna and the Sutlej. It is much broken up, and is interspersed with territories belonging to Jind, Maler Kotla, and Nabha.

The only stream which flows through the state is the Ghaggar, which rises on the lower slopes of the Himalayas in the native state of Sirmur, and flows south-west through Ambala District and Patiala. In Patiala it receives the Saraswati, and after flowing through the Hissar District gets lost in Bikaner on the edge of the Indian desert. Its dry bed can still be traced through Bahawalpur towards the Indus, into which at one time it seems to have flowed.

The Ghaggar is not a perennial stream but depends on the monsoon rainfall, and its waters are much used for irrigation both in the Ambala District and farther to the south-west in Bikaner. The other streams in Patiala, which include the Sirhind Choa, a branch of the Sirhind Canal, are mere summer torrents.

The soil of the state is for the most part of recent alluvium.

**Climate.**—Owing to the distances between different parts of the state, the climate is very varied both in temperature and in rainfall.

The rainfall is highest near the Himalayas, and decreases rapidly as they are left. It reaches 40 inches at **Kalka**, and is only 30 at **Sirhind**, and 25 at **Patiala**, and it decreases rapidly towards the south and south-east. Practically there are no manufactures, save the ordinary village industries.



**Government.**—The Political Agent for the Phulkian States and Bahawalpur, the representative of the Lieutenant-Governor of the Punjab, resides at **Patiala**, a town of over 50,000 inhabitants. The Maharaja is the head of the state, of which there are four departments, the **finance**, the **foreign**, the **judicial**, and the **military**.

The state is divided for administrative purposes into five Nizamats, each under a Nazim, with two or three Naibs or deputy Nazims under him in each Nizamat, and a tahsildār in each tahsil.

**Towns.**—**Patiala**, which lies in a hollow, used to suffer severely from flooding. Against this risk it is now secured by protective works; and it has its surroundings beautifully laid out. It has also many fine public buildings. It is the centre of a very considerable local trade. Among other towns that may be mentioned are **Narnaul**, **Basi**, and **Govindgarh** or **Bhatinda**.

**Nabha** and **Jind**, the two other Phulkian States, are the former rather less than one-fourth, and the latter rather more than one-sixth the size of **Patiala**, through which and through the south-eastern division of the Punjab they are scattered. Neither of the states contains any important stream, and the climate of both, owing to the scattered pieces of which each is made up, is exceedingly diverse. On the whole, however, we may say that the rainfall in both is low, and the summer dry, with a temperature very high.

**Bawal**, a Nizamat of **Nabha**, is in reality geographically a part of the Rajputana desert. In respect of their climate and productions, and in most other respects, these two states closely resemble **Patiala**. The population of each state is about 300,000, or from two to three hundred per square mile. **Nabha** is the more populous.

Each state is governed by a **raja**, who controls the administration with the assistance of a council of state composed of the heads of the departments, into which for administrative purposes affairs are divided. For administrative purposes **Nabha** is divided into three Nizamats, and **Jind** into three tahsils or two Nizamats.

In **Nabha**, **Nabha** is the capital, and has a population of nearly 20,000. **Sangrur** is the capital of the **Jind** State, and has a population of over 10,000.

### Bahawalpur

Bahawalpur is the largest of the native states under the Lieutenant-Governor of the Punjab. His Agent for Bahawalpur is also Agent for the Phulkian States, and resides at Patiala. It is separated from the Punjab on the north-west by the Sutlej, the Panjnad, and the Indus. On the south-east it is bounded by the Rajputana state of Jaisalmer. It has no hills and no rivers, and lies entirely in the alluvium. Lengthwise it is divided into a desert strip along the border of Jaisalmer, a central strip not capable of cultivation, and a fertile tract along the rivers.

**Climate, &c.**—Notwithstanding the fact that the state lies outside the Tropics, the climate is intensely hot and the rainfall exceedingly slight. During May and June the mean temperature in the shade is  $103^{\circ}$ , and the annual rainfall seldom exceeds 5 inches. Except in the river valleys the climate may be considered healthy. The chief crops are wheat, rice, millet, and grain, and these are grown chiefly on irrigated land.

**Government.**—At the head of the administration is the Nawab, who is assisted by a council of eleven members, comprising the Wazir, who is President of the Council, the foreign minister, and the heads of several other departments.

The state is divided into three Nizamats, and each Nizamat is divided into three tahsils, and each tahsil is in charge of a tahsildār and a Naib-tahsildār.

**Towns.**—Bahawalpur, the capital, with a population of nearly 20,000, is the chief town. It is a place of considerable trade. Other towns are Ahmadpur East, Khanpur, and Khairpur.

Under the control of the Commissioner of the Jullundur division of the Punjab there are five native states. These are much larger and much more important than the states under the Commissioner of the Delhi division. The largest of these states is Mandi, with an area of 1200 square miles, and a population of over 170,000; the most populous is Kapurthala, which with half the area of Mandi has a population of nearly 300,000; the smallest is Maler Kotla, which with an area of less than

170 square miles has a population of nearly 80,000; and the least populous is Suket, which with an area of 420 square miles has a population of less than 55,000. Faridkot, which is a little larger than Kapurthala, has a population of 125,000, considerably less than half the population of Kapurthala.

In all these states the soil, climate, physical features, and productions are similar to those of the districts of the Punjab through which the states or pieces of the states are scattered, and the climate is generally good except in the low-lying districts during the rainy season. **Kapurthala**, which has an average of about 500 persons to the square mile, consists of three unequal pieces, the largest of which, making up five-sixths of the whole state, lies on the left bank of the Beas. The annual rainfall is much the same as that of the Jullunder, that is, it runs from 15 to 30 or 40 inches, with an average of about 25 inches. Two-thirds of the area of the state is under cultivation, while a fifth consists of cultivable waste. Of the cultivated land fully one-fifth is irrigated.

**Kapurthala** town, the capital of the state, has a population of nearly 20,000. Other important towns are **Phagwara** and **Sultanpur**.

**Malér Kotla** is bounded by the Ludhiana District on the north, and elsewhere by the Patiala State. The country is a part of the plain and is unbroken by hill or stream, the only breaks of the level being the sand-drifts. **Kotla**, the chief town, has a population of over 20,000.

**Faridkot** lies in the south of the Ferozapore District. In the west it is level and sandy, but in the east, where much of the land is irrigated by the Sirhind Canal, it is much more fertile. The capital, **Faridkot**, has a considerable trade in grain. **Kot Kapura** is the only other town worth remembering.

### Rajputana

Rajputana is the name of a considerable tract of country to the south of the Punjab almost equally divided between the Indo-Gangetic Plain and the Central Indian hill country. Under the name are included eighteen native states, two chiefships, and the small British Commissionership of Ajmer Merwara.

**Jaisalmer**, **Marwar** or **Jodhpur**, and **Bikaner**, on the west and north-west, belong entirely to the Indo-Gangetic Plain, as does **Sind**, the

extreme north-western part of the Province of Bombay. The greater part of Sind is occupied by the alluvium of the Indus, which in the east is often covered by sand dunes, an extension of the Rajputana desert. **Shekhawati**, which belongs to Jaipur, lies in the north-east of Rajputana, and is also a part of the great plain. To the Central Highlands belong **Alwar**, **Bharatpur**, **Dholpur**, **Karauli**, **Jaipur**, **Bundi**, **Kotah**, **Jhalawar** in the north-east and east, and **Partabgarh**, **Banswara**, **Dungarpur**, **Mewar** or **Udaipur**, and **Sirohi** in the south. In the centre are the **Kishangarh** State, the British province of **Ajmer Merwara**, the chiefships of **Shahpura** and **Lawa**, and parts of the chiefship of **Tonk**, the other parts of this chiefship lying to the south and south-east.

**Surface, &c.**—The Aravallis are the most important hills in Rajputana, and Mount Abu, the principal peak, is 5650 feet high. The other hill ranges are comparatively unimportant, but it must be remembered that the south-eastern part of Rajputana everywhere shows the characteristics of a dissected plateau, and is studded with detached hills and isolated crags.

The only river of any consequence in south-western Rajputana is the Luni, which rises to the north of Ajmer and flows west-south-west for about 300 miles into the Rann of Cutch.

The dry bed of the Ghaggar passes through the northern corner of Bikaner, and there what water the river brings down from the Himalayas is utilized by means of two canals for irrigation. The **Chambal**, which for a third of its course flows through Rajputana, and for another third forms the boundary between Rajputana and Gwalior, is the largest river.

Its tributaries on the right bank are the **Kali Sindh** and the **Parbati**, and on the left bank the **Banas**, which with its tributaries drains the south-eastern slopes of the Aravalli. Farther north the **Banganga**, which rises in Jaipur, flows east into the Jumna, while in the south the **Mahi**, which falls into the Gulf of Cambay, flows through a part of Rajputana. There are several artificial sheets of fresh water, but no fresh-water lakes in Rajputana. The largest of these sheets is **Dhebar Lake** in Udaipur.

Lake **Sambhar** is a salt lake lying to the west of Jaipur.

**Climate.**—The heat in summer is everywhere great except among the hills, and in the north-west the climate is of the continental tropical character; the change of temperature between day and night and the difference between summer and winter temperature are both very great. The rainfall is very unequally distributed. The west borders on what is one of the almost rainless regions of the world. In this region, though

the south-west monsoon brings occasional showers, the average rainfall is seldom more than 6 or 7 inches.

In the south-west highlands the rainfall is much more abundant, reaching, it is said, on Mount Abu, sometimes more than 100 inches in a year. Except in this south-west highland region, the rainfall in Rajputana is most abundant in the south-east in **Banswara**, **Jhalawar**, and **Kotah**. In the central parts of Rajputana it is very variable. There, if the eastern winds are strong, the north-east monsoon brings good rains from the Bay of Bengal, while if the south-west monsoon prevails the rains are late and light. If, as sometimes happens, there is a good supply by both monsoons, the rainfall in the central regions is larger than the rainfall in the eastern tract, though it is usually much smaller.

Generally, with the exception of the south-western mountain tract, we may say that the rainfall in Rajputana decreases as we go from south-east to north-west.

The failure of the south-west monsoon is the great cause of famine in the States of Rajputana; and from the earliest times severe famines have been of frequent occurrence. **Bikaner**, **Jaisalmer**, and **Jodhpur** appear from statistics to suffer most on account of famines, and the states along the eastern border of Rajputana to suffer least. The food supplies of the people depend more on the kharif or autumn crops than on the rabi or spring crops.

**Government.**—The Chief Commissioner of the small British province of Ajmer Merwara is also Agent to the Governor-General in Rajputana, and has under him three Residents and five Political Agents, who are accredited to the various states which form the Agency.

The **Mewar Residency** includes the State of Udaipur, **Banswara**, **Dungarpur**, and **Partabgarh**; the **Western Rajputana States Residency** comprises **Jodhpur**, **Jaisalmer**, and **Sirohi**; and the **Jaipur Residency** includes the States of **Jaipur** and **Kishangarh** and the Chiefship of **Lawa**; the **Haraoti and Tonk Agency** includes **Bundi**, **Tonk**, and the **Shahpura Chiefship**; the **Eastern Rajputana States Agency** includes **Bharatpur**, **Dholpur**, and **Karauli**; and besides these there are the **Kotah**, **Jhalawar Agency**, the **Bikaner Agency**, and the **Alwar Agency**.

The actual forms of government are very different in different states. The central authority is usually in the hands of the chief, who is assisted in his government by a council or body of ministerial officers.

**Towns.**—**Jaipur** is the largest town in Rajputana. It is a handsome, modern, regularly-built town, and is the commercial centre and chief manufacturing place in Rajputana. **Jodhpur**, to the north-west, is the capital of the **Jodhpur State** and a

place of considerable trade. **Alwar** and **Bikaner**, the capitals of their respective states, have each over forty and fifty thousand inhabitants, and **Kotah** and **Tonk** close on forty thousand.

### Ajmer Merwara

This isolated British province lies in the centre of Rajputana, and is crossed from south-west to north-east by the Aravalli Hills, so that as far as climate, position, structure, and other geographical matters are concerned it belongs, like the south-eastern part of Rajputana, to Central India, and not to the great plain of Northern India.

It is one of the smaller and less important of the British provinces, but its Chief Commissioner is also Political Agent of the Governor-General in the States of Rajputana. It has an area of 2711 square miles, and a population of less than half a million, and is, as has been said, the western border of the Central Indian Plateau, or rather an outlying part of it, or it may be regarded as the highest part of the great plain of Northern India. The hill on which the fort immediately above the city of Ajmer is built rises to a height of nearly 3000 feet, and from this plateau sinks.

The Aravalli form a real water-dividing range separating the rivers that flow west and south-west into the Red Sea from those that flow east and north-east into the Jumna.

The climate is healthy, hot and dry in summer, and in winter cold and bracing. A shade temperature as high as 116° F. has been recorded in June, and one as low as 35° F. in December. The average annual rainfall is a little over 20 inches, of which fully two-thirds falls in July and August. The highest rainfall recorded during the last twenty-five years has been 37 inches, and the lowest 8 inches in Ajmer and 5 inches in Merwara.

**Surface.**—Ajmer is flat and Merwara hilly; and the soils are generally scanty and the agricultural conditions uncertain. More than 50 per cent of the people live by agriculture. The chief cultivating castes are the Gujars, Jats, Merats, Rajputs, and Rawats.

The province is administered by a Chief Commissioner, who is also a Civil and Sessions Judge, and has control of Police, Forests, Jails, and Education.

Each of the two districts is in charge of an Assistant Commissioner and District Magistrates, whose head-quarters are at Ajmer and Beawar respectively. The province is divided into three tahsils, **Ajmer**, **Beawar**, and **Todgarh**, and is specially legislated for, when that is necessary, by the Governor-General in Executive Council.

**Towns.**—The chief town is Ajmer, with a population of nearly 90,000. It is rich in buildings of antiquarian interest, the most important being the mosque, known as the Arhai-dinka-Jhonpra or “two and a half days’ shed”, which is of the same date as the Kutb Minar near Delhi. Beawar (called also Nayanagar), the head-quarters of the Beawar District, has a population of between twenty and thirty thousand, and is the chief cotton market for the States of Udaipur and Jodhpur.

## Sind

Sind forms politically the north-western part of the Bombay Presidency, but is physically a part of the Indo-Gangetic Plain. It consists of the lower valley and delta of the Indus, and has an area of over 53,000 square miles, and a population of close on 4,000,000. It is bounded on the north by Baluchistan, the Punjab, and Bahawalpur, on the east by Jaisalmer and Jodhpur, on the south by the Rann of Cutch and the Arabian Sea, and on the west by Las Bela and Kalat.

Sind consists of three distinct tracts: the Kohistan, or hilly country in the south-west; the central alluvial plain watered by the Indus; and the Thar, a so-called desert tract on the south-eastern border.

Almost every part of this great alluvial plain has at one time or another formed part of a river channel. The Indus, which brings down great quantities of silt from the Himalayas, deposits this in its channels near its mouth, thus raising its bed and at the same time making irrigation of the surrounding country easy.

Besides the Indus there are some hill streams towards the west, of which the Hab, which forms part of the western boundary of Sind, is the most important. The **Kirthar** Mountains, which separate Sind on the west from Baluchistan, are the only mountains; though some low limestone hills, such as the Ganjo Hills, on which **Hyderabad** stands, cross the Indus valley. Hyderabad was the capital of the Talpur Mirs, the rulers of Sind.

The most fertile region of Sind lies to the north in the neighbourhood of Shikarpur and Larkana. In the eastern part of Sind the **Registan**, a desert tract, consists of sandhills that follow each other like sand ripples, row after row, but are sometimes fairly wooded.

The strip along the Indus for a dozen miles on either side is more fertile than any other part of Sind.

The **Rann of Cutch**, to the south-east, is an immense barren salt-water waste, a large part of which is turned into a lake from June to November by the influx of the sea between **Lakhpāt** and **Bandar**, due to the prevalence of the south-west monsoon. During the other six months of the year, herds of gazelle and a few wild asses roam over its salt-encrusted surface.

Except between Karachi and Cape Monze, the whole coast of Sind is low and flat, with shallow water stretching out for a considerable distance, so that the approach to the shore is dangerous for large vessels, and Karachi is the only good harbour.

**Climate.**—The climate of Sind is marked by intense summer heat, great dryness, and great winter cold. The average summer temperature is  $95^{\circ}$ , and that of winter  $60^{\circ}$ ; but the thermometer sometimes rises in summer to  $120^{\circ}$  in the shade, and falls on winter nights sometimes below freezing-point. The rainfall for the province is scanty and irregular, averaging only about 8 inches. The reason of this is that Sind lies just outside the range of both the south-west and the north-east monsoons, the former seldom passing beyond Lakhpāt in Cutch, and the latter just touching Karachi.

**Government.**—Sind forms a non-regulation sub-province under a Commissioner whose powers are larger than those of the ordinary commissioner of a division.

The province is made up of the four collectorates of Karachi, Sukkur, Larkana, and Hyderabad, and of the two districts of Thar and Parkar and the Upper Sind frontier, each under a Deputy Commissioner. It contains also the native State of Khairpur in the north-east, for which the Collector of Sukkur is Political Agent. The highest court is the Court of the Judicial Commissioner, or, as it is called, the **Sadr Court**. This court is presided over by the Judicial Commissioner and two additional Judicial Commissioners, who perform also the duties of Judges in the District and Sessions Court of Karachi.

**Towns, &c.**—**Karachi**, the capital of Sind, and one of the three great seaports of India, had a population in 1911 of, in round numbers, 160,000. Owing to the prevalence of sea breezes during eight months of the year, the climate of Karachi is more healthy than that of any other place in Sind. The port is the natural outlet for the Indus valley, and has grown with great rapidity in recent years.

**Hyderabad**, the former capital of Sind, stands on a low hill ridge which crosses the Indus valley. It has a population of nearly 70,000.

**Shikarpur**, with a population of about 50,000, is a centre of trade by the Bolan Pass.



**Larkana**, the head-quarters of the Larkana District, has 15,000 inhabitants.

### Khairpur

The native State of Khairpur, like other parts of Sind, is a great alluvial plain, three-quarters of it arid and sterile. The part of the plain, however, bordering on the Indus is rich and fertile.

It is bounded on the north by the Sukkur District, on the east by Jaisalmer State, on the south by the Thar and Parkar and Hyderabad Districts, and on the west by the Indus.

**Climate.**—The climate, though agreeable in the cold weather, that is, during four months of the year, when the temperature falls sometimes as low as 40°, is fiercely hot during the remainder, and the rainfall is slight.

The state has an area of a little over 6000 square miles, and a population of nearly a quarter of a million, four-fifths of whom are Muhammadans and the rest chiefly Hindus. The Hindus are almost entirely **Lohanas**, traders and clerks. The population has been growing rapidly during the last quarter of a century. About 95 per cent of the Muhammadan males and fully one-fourth of the Hindus are cultivators. Sindi, Persian, Sirāiki, and Baluchi are the languages mostly spoken.

**Government, &c.**—The state is divided into five talukas, each under a Mukhtiarkar. The Wazir, an officer lent to the Mir or ruler by the British Government in India, carries on the management of affairs under the Mir, and the Collector of Sukkur is Political Agent for the state. The Indian Penal Code and the Criminal Procedure Code have been adopted.

**Town.**—**Khairpur**, the chief town in the state, has a population of over 15,000, and stands on the Mir Wah Canal about 15 miles east of the Indus. It has a carpet factory, and also makes swords and fire-arms.

### Delhi Province

The Province of Delhi came into existence on the 1st of October, 1912. It consists of a part of what was formerly the Delhi District of the Punjab, and lies to the west of the River Jumna, extending some distance north and south and west of the city of Delhi.

It includes the Delhi tahsil and small parts of the Sonapat and Ballabgarh tahsils. The area of the province as shown in the latest

figures available is 557 square miles, and the population, in round numbers, 400,000.

Near Delhi a spur of the Aravalli, the western hills of Central India, abuts on the Jumna, and here from very remote times one city after another has been built; and tradition has assigned a very remote antiquity to some of these. Delhi, however, as a historical city dates only from the middle of the eleventh century.

From Delhi the famous Prithwi Raj led forth his Hindu vassals and allies against Muhammad of Ghor, who defeated him at Tirawari, 1191. Two years later, Kutb-ud-din, Muhammad's slave general, took Delhi, which became the capital of the Slave dynasty. By this dynasty was built the famous mosque of Kutb-ud-din, a building of matchless size and beauty, and the Kutb Minar, another of Delhi's famous relics. In 1398 the hordes of Timur captured the city, and for five days it was given over to plunder and massacre. The city was rebuilt by Shah Jahan on its present site.

He also built the Jama Masjid and reopened the Western Jumna Canal, and from his time Delhi was the head-quarters of the Mughal Emperors. Nadir Shah, the Persian, captured the city, plundered it, and massacred its inhabitants in 1739. In 1788 the Marathas placed a garrison in Delhi, and the Emperor remained their prisoner till the city was captured by Lord Lake in 1803. Delhi was seized by the mutineers, but was recovered by the British in September, 1857. On various occasions since the Mutiny it has been the scene of Imperial assemblage; and on the accession of the present King-Emperor, George V, it was decided to make Delhi, what it had never before been, the capital of the Empire of India.

## CENTRAL HIGHLANDS

The Central Highlands is a great bounding region separating the Plain of Northern India from the Deccan. They may be said to extend from Cutch and Kathiawar on the west to Bihar and Orissa on the east, and to include besides Central India and the Central Provinces and Berar, Gujarat, with Cutch and Kathiawar on the west, and the Bihar and Orissa states on the east.

### Cutch

Cutch is a native state under the superintendence of the Government of the Bombay Presidency. It has an area of between seven and eight thousand square miles, and is almost completely cut off from India by the Rann of Cutch on the north, the Little Rann and Gulf of Cutch on the south, and the Arabian Sea on the west.

Cutch is a barren, rocky, almost treeless stretch, with hills rising to between 900 and 1000 feet, without a permanent river, and having to the north of it a curious level stretch known as the Rann, liable to be submerged by the sea, and occupied only by herdsman. Though volcanoes are no longer active in the district, Cutch suffers from frequent earthquake shocks. Wheat and barley are cultivated as are also cotton, millet, and pulse. Cutch lies almost beyond the limit of the south-west monsoon, and the rainfall averages only a little more than 12 inches. Iron and coal are found, but are not worked. The population numbers fully half a million, of whom fully three-fifths are Hindus, fully one-fifth Muhammadans, and the remainder Jains, Parsis, and Christians. The people speak Kachchhi and Gujarāti.

**Bhuj**, the capital, has the palace of the Rao, or native ruler. Its population is 25,000.

### Kathiawar

The peninsula lying to the west of Gujarat and of the line joining the Little Rann and the Gulf of Cambay is called Kathiawar, and has a length of 220 miles, a breadth of 165 miles, and a total area of between 23,000 and 24,000 square miles, with a population of nearly 3,000,000. 1200 square miles of the peninsula belong to the Gaekwar of Baroda, nearly 1300 to the Ahmadabad District of Bombay, 20 square miles to the Portuguese possession of Diu at the south-west corner, and the remainder—about 21,000 square miles—forms nearly 200 separate states, great and small.

**Climate, &c.**—The climate is temperate and the rainfall moderate, and the quality and depth of soil varied, but generally good; yet Kathiawar is, as a whole, comparatively sparsely peopled, and the soil is poorly cultivated.

Cotton is grown on the black soil (*kampal*), and occupies little less than one-third of the total area under cultivation. Next in importance to cotton are millet and jowar, while wheat is grown on about 5 per cent of the land. Horses are bred, and the peninsula is noted for its milch cows and its buffaloes. Besides the Gir Forest, which extends to 1500 square miles, there are other important wooded tracts in Kathiawar. The peninsula supplies excellent building stone, and iron ore was formerly mined. Kathiawar supplies one-sixth of the total cotton shipped from Bombay. It also exports wool, and imports grain and bullion. Kathiawar has some 600 miles of railway of different gauges.

**People.**—The ruling families of the majority of the states are Rajputs. The Rajput cultivators acquired land from their neighbours; and, when they thought themselves strong enough,

set up as independent rulers, taking the titles of Thakur, Jam, Raval, Rana, or Raja. The people are divided into castes, and are mainly Hindus in religion, though 14 per cent are Mussulmans and 5 per cent Jains. The language chiefly spoken is Gujarātī.

**Chief Towns.**—The chief towns are: Bhaunagar, with a population of over 60,000; Navanagar, with a population of over 50,000; Junagarh, with a population of between 30,000 and 40,000. Rajkot, with a population of close on 40,000, is the residence of the Agent to the Governor of Bombay.

**Dhoraji**, a fortified town in the state of Gondal, has a population of 25,000. **Porbandar**, the railway terminus, has a population of 15,000. Except the last two, the towns mentioned are the capitals of the native states.

### Gujarāt

Gujarāt is the name given to the part of the central Highlands east of Kathiawar and the Rann of Cutch, and north of the Narbada. It has an area of about 30,000 square miles, and a population of about 5,000,000.

Less than one-fourth of this, a little over 7000 square miles in the centre and south, belongs to the four Bombay Districts of **Ahmadābād**, **Kaira**, **Panch-Mahals**, and **Broach**; about 5000 square miles in two blocks are part of Baroda; and the remainder is made up of a number of small states in the Agencies of **Palanpur** in the north, **Mahi Kantha** in the north-east, **Rewa Kantha** in the east, and **Cambay** in the south, at the head of the gulf.

**Gujarāt** is bounded on the north by the desert of Marwar or Jodhpur; on the east by a range of crystalline hills that run from Mount Abu south-east to the western outliers of the Vindhya. In the neighbourhood of these hills the country is rocky and well-wooded, and from these it slopes south-west to the Rann of Cutch and the Gulf of Cambay. The northern part is watered by the Western Banas and Saraswati, which fall into the Little Rann, and the southern part by the Sabarmati and the Mahi, which fall into the head of the Gulf of Cambay. The country is said to derive its name from the **Gūjars**, a Central Asia tribe who entered India with the white Huns in the latter part of the fifth century.

The **Mahi Kantha Agency** has an area of a little more than 3000 square miles, and is divided up into fifty-one states, varying in size from **Idar** the largest, with an area of nearly 1700 square miles, to **Sadra-Bazar**, which has an area of only one square mile.

The population of the Agency is somewhere about half a million, more than 90 per cent being Hindus, 5 per cent Muhammadans, and 3 per cent Jains.

The **Rewa Kantha Agency**, in the east of Gujarat, lies chiefly between the Narbada and the Mahi, though a small part of the Agency lies to the south of the Rewa or Narbada. It has to the north of it the Rajputana states of Dungarpur and Banswara. It has a length of 140 miles, and a breadth varying from 10 to 50 miles. The Agency is composed of sixty-two states, of which nine are over 100 square miles in area, four between 20 and 40 square miles, and the rest less than 20 square miles. The population of the Agency is less than three-quarters of a million, and that of the largest and most populous state less than 15,000.

The chief towns are **Nandod**, the capital of Rājpipla, and **Lūnāvāda** and **Bālāsīnor**, capitals of states of the same name in the Rewa Kantha Agency.

The **Palanpur Agency** is formed by a group of native states in the extreme north of the Bombay Presidency proper. The Agency has to the north of it the Rajputana states of Udaipur and Sirohi, to the east the Mahi Kantha Agency, to the south Baroda and Kathiawar, and to the west the Rann of Cutch. It has an area of between six and seven thousand square miles, and a total population of less than half a million. It is composed of seventeen states, and the headquarters of the Agency are at **Palanpur Town**.

**Cambay** is the only native state of the Kaira Agency, and lies at the head of the Gulf of Cambay, having to the north of it the Kaira District, to the east the Kaira District and Baroda, to the south the Gulf of Cambay, and to the west the Sabarmati River. It has an area of 350 square miles, and a population of nearly 100,000. Cambay, the chief town, has a population of between thirty and forty thousand.

**Baroda**.—The territories of the Gaekwār form an important native state, partly in Gujarat and partly in Kathiawar, associated geographically with the Bombay Presidency, but in direct relation with the Government of India.

The area of Baroda is a little more than 8000 square miles, and it has a population of over 2,000,000.

**Climate, &c.**—Owing to the scattered nature of the state, the climate is very much more varied than one would expect from its size. May and June are the hottest months, when the temperature rises sometimes as high as 110°, with a minimum of 80°. The cold season lasts for about four months, and has a maximum temperature of 90° and a minimum of 50°.

The rainfall varies from an average of a little over 20 inches in the Amreli *prānt* or District to a little over 50 inches in the Navsari *prānt*.

We may say in a general way that the rainfall increases from west to east and from north to south. The soil is generally alluvial, and is either black or red.

**Government.**—The affairs of the state are managed by a council under the control of the Maharaja, who is assisted by a Diwan and other officers. Fully three-fourths of the people are Hindus, nearly 8 per cent are animists, and fully 2 per cent are Mussulmans. The bulk of the people speak Gujarāṭi, and most of the remainder Marāṭhī or Hindustani.

### Towns, &c.

**Baroda City**, the capital, has a population of over 100,000. It contains the principal offices of the state, the state library, the Nazar Bagh or new palace of the Gaekwar, in which are stored his almost matchless collection of jewels, and many other objects of interest.

**Patan**, with a population of between thirty and forty thousand, carries on the manufacture of swords, embroidery, and pottery. It is noted for its silk manufacture, and wood-carving and ivory-turning are also practised.

### Central India

This is the name given to a collection of native states under the supervision of the Agent to the Governor-General in Central India. The total area of the states forming Central India is in round numbers 78,000 square miles, and the total population between nine and ten millions. The name was first given to Malwa, but when Bundelkhand and Baghelkand were added in 1854 the name was extended to the whole region.

**Surface.**—We may divide Central India into the plateau region, the valley or low-lying tracts, and the hilly tracts. The plateau includes most of the Malwa tableland, with an average elevation of 1600 feet, and an area of about 35,000 square miles. The low-lying division is to the north and east of Gwalior, and embraces a great part of Bundelkhand. It has an area of over 18,000 square miles, while the hilly tracts lie chiefly along the Vindhya and Satpura ranges, and embraces an area of about 25,000 square miles.

**Climate, &c.**—The climate of Central India is healthy, and the plateau region is noted all over India for the coolness of its nights during the hot season. The temperature is highest in May and lowest

in January, but in the plateau region the average difference of temperature is only 26°. The rainfall on the plateau averages about 30 inches, and in the low-lying parts a little over 40 inches.

**Government, &c.**—Central India includes altogether 148 native states, which range in size from Gwalior, with an area of 25,000 square miles, to states consisting of a single village. For administrative purposes Central India is divided into the following groups:—

(1) **Bhopawar Agency**, consisting of 21 states, the principal of which is Dhar; (2) **Indore Residency**, consisting of 2 states, the principal of which is Indore; (3) **Bhopal Agency**, consisting of 16 states, the principal of which is Bhopal; (4) **Malwa Agency**, consisting of 24 states, the chief of which are Dewās and Jaora; (5) **Gwalior Residency**, consisting of 19 states, of which the principal is Gwalior; (6) **Bundelkhand Agency**, consisting of 23 states, the chief of which is Orchha and Datia; and (7) **Baghelkhand Agency**, consisting of 12 states, the chief of which is Rewah.

Eleven of the states are held under direct treaty arrangements with the British Government, and are known as the treaty states. These are **Gwalior**, **Indore**, **Bhopal**, **Dhar**, **Dewas** (Senior and Junior), **Jaora** in the western section, and in the eastern section **Orchha**, **Datia**, **Samthar**, **Panna**, and **Rewah**.

**Gwalior.**—The state has an area of 25,000 square miles, and a population of a little more than 3,000,000. The greater part of it, some 17,000 square miles, forms a portion of the Political charge known as the Gwalior Residency, which includes besides some nineteen smaller states, some of them, indeed, very small.

The Resident, who is the officer accredited to the Gwalior Darbar, is the channel of communication between the Darbar and other political officers, like the Agents in Bhopawar and Malwa. Gwalior State is divided into eleven districts of an average area of 2300 square miles and an average population of roughly 300,000. The chief bears the title of Maharaja, and is spoken of as His Highness.

Owing to the scattered areas covered by the state, a great many different languages are spoken. **Malwi** is spoken by about 25 per cent of the people, but it is the prevailing language of the western part of the state. **Bundeli**, spoken by 18 per cent, is the language of 70 per cent of the people of Bhandāra, and of 86 per cent of the people of Bhilsa. **Urdu**, the language of the official class, is returned as spoken by 18 per cent of the people, and **western Hindi** as spoken by 13 per cent.

**Towns.**—The old capital of the state was **Gwalior**, a desolate-looking, half-deserted place occupied chiefly by Muhammadans. To

the east of Gwalior is the mausoleum of Muhammad Ghaus, and two miles to the south of it **Lashkar**, the modern capital and the residence of the Maharaja. **Ujjain**, in the centre of the Malwa portion of Gwalior, is the traditional capital of Malwa, and one of the most sacred cities of the Hindus. In early times it was called Avanti, and that name is still given to it by the Brahmans in their devotion.

**Indore.**—The greater part of the **Indore State** is in the charge of the Resident, and consists of several detached tracts, the largest of which lies south of the Nerbada River. The tracts belong either to the plateau or to the hilly division of Central India.

Indore has a population of a little more than 1,000,000. It is divided into five districts, and the chief, the Maharaja, is at the head of affairs. He is assisted by a council, and matters in general are supervised by the Resident.

The chief towns are **Indore**, on the Saraswati, with a population of close on 100,000, one of the largest trade centres in Central India; and **Mhow**, the British cantonment, with a population of nearly 40,000. There are no other towns in the Residency with a population of over 10,000.

**Bhopal** is, next to Hyderabad, the most important Muhammadan state in India. It has an area of about 7000 square miles, and a population of a little over 1,000,000. It is divided into four Nizamats. Hindus form 73 per cent, animists 14 per cent, and Mussulmans 13 per cent of the population.

The ruler, the Begum, has full powers in all administrative matters, and is assisted by two ministers, the one in charge of the financial, and the other of judicial and police matters.

The chief towns are **Bhopal**, with a population of about 80,000, picturesquely situated on the side of two artificial lakes, at the junction of the two lines, the Great Indian Peninsula and the Bhopal-Ujjain, is a centre of trade and industry. The only other town with over 10,000 inhabitants is the British military station at **Sehore**.

**Dhar**, a treaty state, and chief native state under the Bhopalwar Agency, has an area of fully 1700 square miles, and a population of about 150,000. The chief or Raja has control, according to treaty, of all civil, judicial, and ordinary administrative matters. The capital of the state is **Dhar**, a very old town with a population of over 15,000.

**Dewas** (Senior and Junior Branches), are twin states in the



Malwa Agency, with an area the one of 440, and the other 446 square miles, and a population of over 50,000 each.

**Dewas Town**, the capital of the twin states, each of which is ruled by a Raja, has a population of over 15,000. •

**Jaora**, the chief state of the Malwa Agency, lies in the Malwa highlands. It has an area of 568 square miles, is governed by a Nawab, and its population is over 100,000. The Nawab is the final authority in administrative matters, and the chief town, Jaora, from which the state takes its name, has a population of between twenty and thirty thousand.

**Orchha** and **Datia** are the two principal states in the Bundelkhand Agency. The former has an area of a little over 2000 square miles, and a population of between three and four hundred thousand; while the area of the latter is only 912 square miles, and the population less than 200,000. Each is governed by a Maharaja, a Bundela Rajput, who, as both are treaty states, exercises full powers in civil and in criminal matters.

**Tikamgarh**, the capital of the Orchha State and the residence of the Maharaja, has a population of nearly 15,000. Until 1887 it was known as Tehri. **Datia Town**, the capital of Datia State, has a population of nearly 35,000.

**Samthar** is another treaty state under the Bundelkhand Agency, and has an area of 178 square miles and a population of between forty and fifty thousand. Its affairs are administered by the chief, the Raja, assisted by his minister or Wazir.

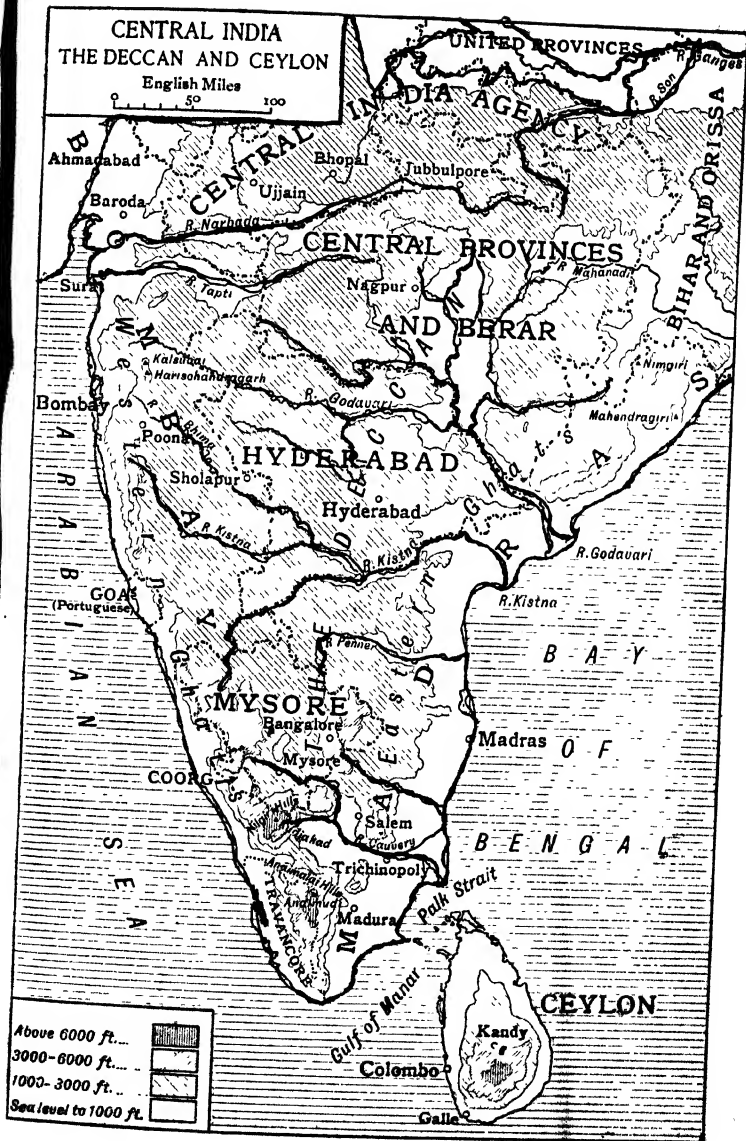
**Panna**, a sanad or treaty state under the Bundelkhand Agency, has an area of nearly 2500 square miles, and a population of roughly 200,000. Its diamond mines have been known since the seventeenth century. It is governed by a Maharaja, whose capital is Panna, a town with between eleven and twelve thousand inhabitants.

**Rewah** is the chief state in the Baghelkhand Agency. It has an area of 13,000 square miles, and is ruled by a Maharaja, who is assisted by two commissioners, one for revenue and one for law. The state is rich in minerals, including coal at Umaria. **Rewah**, the chief town, has a population of between twenty and thirty thousand.

# CENTRAL INDIA THE DECCAN AND CEYLON

English Miles

0 50 100



### Central Provinces

These occupy the middle of the Central Indian Hill Region; and, if we take the line of the Tapti and the Mahanadi for the dividing line between the Central Indian Hill Region and the Deccan, they include also a small part of the Northern Deccan. The Central Provinces have a length from north to south of about 500 miles, and are of about the same breadth from east to west. Including Berar, the provinces have an area of over 130,000 square miles, and a population of over 16,000,000. They are nearly surrounded by native states, and under the Chief Commissioner of the Central Provinces are fifteen native states with an area of over 31,000 square miles, and a population of a little more than 2,000,000.

**Physical Features.**—The extreme north-west of the Central Provinces is part of the Malwa Plateau, with the southern scarp known here as the Bhannar Range rising steeply from the Narbada valley, and with the country sloping generally thence towards the Ganges valley. Next comes the Narbada valley between the Vindhya and the Satpura. The Satpura is a triangular elevated region south of the Narbada, with its eastern or shorter side stretching for about 100 miles from Amarkantak to Balaghat, and its northern and southern sides running westward for about 400 miles and terminating in two parallel ridges one on either side of the narrow Tapti valley.

These form the watershed of the plains to the north and to the south, and in them rise the **Narbada** and **Tapti**, the **Wardha** and the **Wainganga**. Along the southern and eastern faces of the Satpura lie the plains of Nagpur and Chhattisgarh, the former drained by the Wardha and the Wainganga, and the latter by the streams that form the **Upper Mahanadi**. To the south-west is **Berar**, the northern part of which drains north-west into the **Tapti**, and the southern east and south-east by the **Penganga** into the **Godavari**. To the east of Chhattisgarh is the plain of the middle Mahanadi.

**Climate.**—The part of the Central Provinces north of the Satpura has a distinctly lower temperature than the rest. This is partly due to the height of the region and partly to the cooling effect of the westerly winds which blow during the dry season north of the Satpura Range. South of the Satpura the

temperature is as much higher as 6° in December, 5° in November, 4° in April and October, and only 1° during the rainy season.

The maximum shade temperature recorded in the Provinces is 119° at Chanda in the south, and the minimum 30° at Pachmarhi, the sanatorium in the Mahadeo hills in Hoshangabad District. The rainfall averages 47 inches, varying from 32 inches in Nimar, in the south-west, to 62 inches at Balaghat in the centre. The mean annual rainfall of the districts towards the east, where rice is the chief crop, is 55 inches.

**Administration.**—The affairs of the Central Provinces are directed by a Chief Commissioner, who is assisted by three secretaries, two under-secretaries, and an assistant secretary. The area of the Central Provinces and Berar may be taken in round numbers at 100,000 square miles. For administrative purposes the Central Provinces are divided into four divisions, the Chhattisgarh Division, the Jubbulpore, the Nagpur, and the Nerbada. Three of these divisions contain five districts, and one, the Chhattisgarh, contains only three. Each division has an average area of over 20,000 square miles, and a population of fully 3½ millions.

Berar, which has been added to the Central Provinces, has an area of over 17,000 square miles, and a population of over 3,000,000, so that it may be regarded as equivalent to an additional division.

Berar is divided into six districts, with an average area of 3000 square miles, and an average population of fully half a million. Each district is managed by a Deputy Commissioner as each division is managed by a Commissioner. Each district is divided into two or more tahsils, each of which has a tahsildār and a naib, or deputy tahsildār, who assists the Deputy Commissioner in his revenue and administrative work. In every village there are one or more lam-bardars, whose duty it is to collect and to pay in the Government revenue.

Under the Deputy Commissioner there are in each district also revenue inspectors, with patwaris under them. On an average there is in the Central Provinces one patwari for every eight villages, and one revenue inspector for every twenty-five patwaris.

Berar, which forms one local division under a Commissioner, is divided for the administration of justice into the two Civil Districts of East Berar and West Berar.

**Towns.**—The largest town in the Central Provinces is Nagpur, with a population of slightly more than 100,000. It is the head-quarters of the Central Provinces administration, a railway centre and a centre of industry and commerce.

**Kamptee**, 9 miles north-east of Nagpur, is an important military station.

**Jubbulpore**, the head-quarters of the division and of the district of the name, has a population of about 100,000, which is steadily increasing. It is an important industrial and commercial town about 16 miles from the sacred river, the Nerbada, and about 13 from the place where that river passes through the well-known Marble Rocks.

**Raipur** is the head-quarters of the Chhattisgarh Division and of the Raipur District, and has a population of about 25,000. It is believed to have existed since the ninth century, and has some interesting archæological remains. It contains also the Rajkumar College for the sons of feudatory chiefs and landholders.

### Feudatory States

Under the Chief Commissioner there are **fifteen feudatory states**, with an area of over 31,000 square miles, and a population of over two millions. One of these native states, Makrai, lies in the Hoshangabad District; the others lie in the Chhattisgarh Division, which contains, therefore, no fewer than fourteen native states.

The native states vary greatly in size, from **Sakri**, the smallest, which has an area of only 138 square miles, to **Bastar**, the largest, with an area of over 13,000 square miles. The states are ruled by native chiefs, who exercise supreme control save in the case of death sentences, which must receive the Chief Commissioner's confirmation before they can be carried out. The Council of the Governor-General of India makes laws for the Central Provinces.

**Bastar**, in the south-east corner of the Central Provinces, south of Kankar, is a feudatory state with an area of a little over 13,000 square miles, and a population of a little over 300,000, lying almost entirely in the basin of the Godavari. The central and north-western parts are mountainous, and along the east there is a plateau about 2000 feet high broken by isolated ridges. The south-western parts are low, but are broken by ridges of sandstones.

Bastar is drained chiefly by the **Indravati** and its tributaries. Two-thirds of the people are Gonds, still in an uncivilized state, indeed in some localities they wear no clothing. The language chiefly spoken is Halbi, a mixed dialect of Hindi, Oriya, and Marathi. Rice is the chief crop, but small millets, pulses, and grain are also grown. There are no statistics of cultivation, but fully three-fourths of the whole area is in grass or forest. **Jagdarpur** is the new capital and **Bastar** is the old.

The north-east corner of the Central Provinces is occupied by what are called collectively the **Surguja States**. The largest of these is **Surguja**, with an area of over 6000 square miles, and a population of over 350,000. Among the other states are **Chang Bhakar**, area 904 square miles, and population about 20,000; **Korea**, with an area of 1600 square miles, and a population of under 40,000; **Udaipur**, with an area of 1052 square miles, and a population of nearly 50,000; **Jashpur**, with an area of nearly 2000 square miles, and a population of nearly 150,000;

**Raigarh**, with an area of nearly 1500 square miles, and a population of over 170,000.

### The Bihar and Orissa States

The twenty-six petty states attached to the new Province of Bihar and Orissa lie on the eastern slopes of the Central Indian plateau. The states lie on a succession of ranges rolling back towards the centre of the peninsula, and forming three watersheds with fine valleys between.

In some parts the hills rise to a height little short of 4000 feet, Malayagiri, the highest, reaching a height of 3895 feet. The underlying rocks are for the most part very old metamorphic rocks, gneisses and schists, save in Talcher and parts of Angul and Athgarh, where sandstones, &c., belonging to the Gondwana series are developed. The scenery is wild and beautiful, and the river beds rugged and full of boulders, while the ranges of hills are usually densely wooded to their very summits. The valleys between the ranges are exceedingly fertile, and yield large crops in return for very careless cultivation. The narrower valleys are often terraced so that rice may be grown on the fields.

**Climate.**—We have no record of the temperature, &c., in these states, but it is said to be like that of Orissa, the southern part of the province, only hotter in summer and colder in winter. The annual rainfall, of which eight-ninths falls from May to October, averages about 55 inches.

The people are hillmen—Bhuiyas, Savaras, Gonds, and Khonds, of Kolarian or Dravidian origin—and are broken up into a vast number of communal or tribal groups, each under its own headman or chief. Oriya is the speech of fully three-fourths of the people, while between one-fifth and one-sixth speak Munda dialects. Nine-tenths of the people are Hindus, and about one-twelfth are Animists. They are divided into castes.

Of the twenty-six tributary states belonging to Bihar and Orissa, only two, **Kharsawan** and **Saraikela**, are under the sub-province of Chutia-Nagpur. The former has an area of 153 square miles, and the latter of 449 square miles, so both are very small states.

The twenty-four tributary states under Orissa sub-province consist of the seventeen original tributary states under Orissa, of which the largest and most populous is **Mayurbhanj**. Mayurbhanj, which is also the most northern of the Orissa tributary states, has, like other states in this central region, very rich deposits of iron ore. Next to Mayurbhanj, the largest and most important of the states are **Keonjhar** and **Dhenkanal**. **Nayagarh**, with an area of less than 600 square miles, has a population of about 150,000. The total area of the seventeen Orissan states is over 14,000 square miles, and the total population over 2,000,000.

The five states added from the Central Provinces and the

two added from Chutia-Nagpur have an area almost equal to that of the original seventeen states, and a population of one and a quarter millions. Like the other tributary states, they lie on the eastern slopes of the Central Indian plateau. The rivers that flow through them are the Mahanadi and the Brahmani.

Rice, various kinds of grain, and sesamum are among the chief crops, and cotton and tasar silk are produced.

**Kalahandi**, the largest of these seven tributary states, has an area of close on 4000 square miles, and a population of not much less than 400,000, while **Rairakhol**, the smallest, has an area of only a little more than 800 square miles, and a population of less than 30,000.

## THE DECCAN

### Madras

Madras has an area in round numbers of 142,000 square miles, and a population of 42,000,000. It is officially called the Presidency of Fort St. George, as Bengal is officially called the Presidency of Fort William; it is the oldest, and was long the most important of the original presidencies. Madras differs from the other large provinces of British India in having no Commissioners' divisions. In Madras the District Officer corresponds directly with the Government or Board of Revenue, and not, as in the other provinces, through a divisional Commissioner.

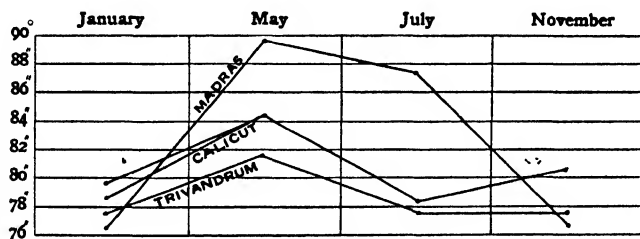
If we include with it the five native states, **Travancore**, **Cochin**, **Pudukottai**, **Banganapalle**, and **Sandur**, and also the state of Mysore and the small British province of Coorg which are surrounded by it, Madras occupies the whole of the southern part of the Deccan.

**Climate.**—The average temperature is higher than in the north, but the diurnal and annual variations are both less; the mean annual temperature at Tinnevely is 85.4°, but this is due rather to the absence of moderately cool weather during the cold season than to the intense heat of summer. The mean annual temperature at Wellington in the Nilgiris is only 62°.

Generally the climate is marked by great heat, and in the inland

parts by great dryness. The chief rain-bringing wind is the south-west monsoon, which blows from the end of May to the beginning of October. The Ghats on the west intercept much of the moisture, and places to the east lying in their rain shadow have from the south-west monsoon a much lower rainfall than would be expected.

During October, November, and December the north-east monsoon prevails, but the rainfall from it is heaviest on the part of the coast between Madras and Palk Strait. The rainfall due to the north-east monsoon in the Deccan parts of the presidency is in many cases less than 10 inches. At the change of the monsoons storms often occur that do considerable damage both on sea and on land. Earthquakes, too, are not infrequent in the presidency.



Annual Temperature, Madras Presidency

**Administration.**—The Governor of the presidency is assisted by an Executive Council of three members. The Legislative Council consists of forty-eight members, twenty-four of whom are nominated (not more than seventeen of the twenty-four can be officials). Of the rest, nineteen are members elected, two ex-officio members, and two are extra members. The various branches of the administration are under the control of the heads of the various departments, who correspond with the Government through the Secretariat. The latter is divided into a number of branches under the management of appointed secretaries.

The unit of provincial administration is the district or collectorate, and for nearly all purposes the Presidency is divided into twenty-four such districts. Each of these has an average area of 7000 square miles, and a population of about 2,000,000.

Each district is divided into three or four subdivisions, most of which are under deputy collectors.

The subdivisions are divided into Taluks in charge of native tahsildars, aided by deputy tahsildars. The Taluks are divided into Firkas, each under the immediate charge of a revenue inspector. The ultimate



unit is the village with its headman, who is responsible for the collection of the revenue.

In Madras city, justice is administered by three Civil Courts, the **Small Cause Court**, the **City Civil Court**, and the **High Court**. Outside Madras there are five kinds of Civil Courts: **Village**, **Revenue**, **District Munsifs**, **Subordinate Judges**, and **District Courts**. In the Agency tracts the revenue officers exercise judicial functions subject to appeal. In Madras as in the other Presidencies there is a **High Court**, supreme both in civil and in criminal business, from which the only appeal is to the judicial committee of the Privy Council in England.

**Towns.**—**Madras**, the capital of the presidency, lies on the low coast of the Bay of Bengal, and covers for its population of little over half a million a very considerable area. Its public buildings are exceedingly handsome, and though the city has no natural harbour it ranks fifth among the ports of India. By the building of breakwaters the open roadstead of Madras has been turned into a harbour where steamers can lie in comparative safety. P. & O. steamers now call at the port, and further improvements are being made. Though its climate has been described as "three months hot and nine months hotter", Madras has not been found unhealthy by Europeans.

**Madura**, on the south bank of the River Vaigai, between three and four hundred miles south of Madras, has a population of over 130,000 and is rapidly growing. It is an important educational and industrial centre. Its chief industry is weaving, and it has also a cotton-spinning mill.

**Trichinopoly** is a very old town, and one of the great educational centres in the south of the presidency. Its population, including the cantonment, is nearly 125,000, and the city has many interesting archæological remains, including the shrine to Ganesa or Ganesh on the city's famous rock, and the Nawab's palace close to the rock. **Calicut**, the fourth largest city in the presidency, has a population of nearly 80,000. It exports chiefly coffee, and imports grain and salt.

**Salem**, the head-quarters of the district of the same name, has a population of about 60,000, is beautifully situated, and is a silk- and cotton-weaving centre. **Kumbakonam**, **Bellary**, **Trivandrum**, **Tanjore**, **Negapatam**, and **Coimbatore** are all towns with over 50,000 inhabitants.

### Madras Native States

In all the five states under the Madras Government a Legislative Council prepares regulations for the administration of affairs. These, before being put into force, must receive the sanction of the Madras Government. The Maharaja of Travancore and the Raja of Cochin possess powers of life and death; but the affairs of both states are supervised by the Resident at Trivandrum. Both states are admirably managed by their rulers, and are exceedingly prosperous.

**Travancore**, with an area of a little over 7000 square miles, has a population of about 3½ millions, the population having increased during the decade ending 1911 by nearly half a million. **Cochin**, with an area less than one-fifth that of Travancore, has an increasing population of nearly a million. Both states are on the west coast, and are part of what is the most beautiful and most fertile region in the peninsula. The states are flanked on the east by the Western Ghats, which reach a height in Anaimudi Peak of nearly 9000 feet, and have along their coast a chain of lagoons or backwaters parallel to the sea. These lagoons receive the numerous streams that flow down from the Western Ghats. In Travancore there are a few freshwater lakes, the largest being Vellani, near Trivandrum. Of the rivers the largest is the Periyar, the upper waters of which have been utilized for the irrigation of the Madura District of Madras.

**Trivandrum**, the chief town of Travancore, is a great religious centre, with the famous shrine of Sri Ananta Padmanabhaswami, which draws pilgrims all the year round from all parts of India. **Cochin**, in British territory, is the chief port in Malabar. It exports coco-nut oil, and coir.

**Pudukottai** is the most important of the three remaining states under the Madras Government. It comprises an area of 1100 square miles, and has a population of over 400,000.

The Raja or Tondiman is assisted in the management of affairs by a minister and a councillor, and by an advisory representative assembly which meets only once a year. **Pudukottai**, the capital, a clean, airy, well-built town, has a population of over 20,000.

**Banganapalle** lies in the Kurnool District on the tableland, and has an area of 255 square miles, and a population of between thirty and forty thousand. It is ruled by a Nawab.

**Sandur** is the smallest and least populous of the five states under the Madras Government. It has an area of 161 square miles, and a population of between eleven and twelve thousand. It exports manganese ore.

### Hyderabad, or the Nizam's Dominions

Hyderābād is by far the largest and the most important of the native states of India. It forms an irregular polygon in the centre of the tableland, having to the north and north-east of it the Central Provinces and Berar, to the south-east and south Madras, and to the west Bombay. It has an area of nearly 83,000 square miles, and a population of between thirteen and fourteen millions.

**Climate, &c.**—The climate may generally be considered good, though not perfectly healthy. The heat is never so oppressive as in the northern plain, owing largely to the hill character of the country. The mean temperature is about 81°, and the

average annual rainfall is estimated at a little over 30 inches. There are three fairly well-marked seasons: the rainy from June to October, the cold from October to February, and the hot from February to May.

**Productions.**—The soils of the state may be classified as black, red, sandy, and a mixture of black and red. Cotton of the short-stapled variety is largely raised in all the black-soil districts; but of the total land cultivated, by far the largest portion is devoted to the production of food-stuffs. There are two sowings: the *kharif* sowings in June or January, and the *rabi* sowings in September or October.

Hyderabad is rich in minerals, including coal in the Warangal Division. Gold is found in the south-west, though want of water to work the stamps has hampered the development of the mines, and iron-ore deposits occur all over the state. Diamonds have been worked from very early times, and graphite, copper, and other mineral ores have recently been discovered, while the state yields excellent limestone and other building stone.

**Administration.**—The Nizam is the head of the state, but the administration of affairs is carried on under him by a Minister and four Assistant Ministers. The Assistant Ministers are: the Minister of Finance, the Minister of Law, the Army Minister, and a Minister of Miscellaneous Affairs. The latter has under his control the police, public works, education, and sanitation.

The state is divided into four divisions or subahs, namely, **Aurangabad Division**, **Gulbarga Division**, **Gulshanābād (Medak) Division**, and **Warangal Division**. The subahs, each under a subahdar, are divided into districts. Of these districts there are fifteen in all, each under a first talukdar (collector). Under the first talukdar there are two or more assistants known as second and third talukdars as the case may be. The subahs have an average area of 20,000 square miles, and an average population of 3,000,000. The average district area is between five and six thousand square miles, and the average population between eight and nine hundred thousand. There are one hundred taluks, as the subdivisions of the district are called, each under a tahsildār, who has charge of the revenue and the magisterial work. He is helped by a peshkar (assistant) and by a girdavar (revenue inspector). The village headman is called the patel, and the village accountant the patwari, karnau, or kulkarni. There is a legislative council consisting at present of nineteen members, of whom eleven are official, six non-official, and two nominated by the ministers from among the residents of the state.

For the administration of justice there are some four hundred Courts, counting both the Civil and the Criminal. The lowest magistrate is the tahsildār, or rather the naib or deputy tahsildār, who can try suits up

to Rs100; then follow the munsifs, who can try suits up to Rs500; then the first talukdars, who can try suits without limit as to the amount involved.

### Towns

**Hyderābād**, the capital of the state, stands on the Musi, a tributary of the Kistna. It is connected by rail with the rest of India. Among the principal buildings are the Nizam's Palace, the Char Minar, or "four minarets", the British Residency, and some of the mosques. Hyderābād is an important trade centre and has cotton mills. It has a population in round numbers of 500,000, and is the fourth largest city in India.

**Secunderābād** lies six miles north-east of Hyderabad, of which in a way it may be regarded as a suburb. It is one of the largest military stations in India, and has a population, including Bolarum, of close on 100,000.

None of the other towns in the state has a population of 50,000.

**Gulbarga**, a trading centre on the Great Indian Peninsular Railway, has cotton mills and a population of close on 30,000.

**Aurangābād**, on the Nizam's Railway, in the north-west, was a favourite residence of Aurangzeb. It is now but a shadow of what it was formerly, and has a population of little over 25,000.

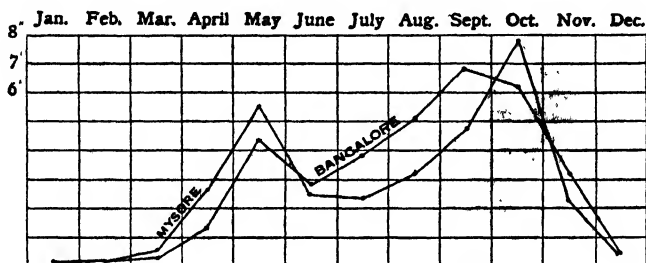
**Raichur**, at the junction of the Madras and of the Great Indian Peninsular Railway, is a rising commercial centre.

### Mysore State

Mysore State lies between  $11^{\circ} 36'$  and  $15^{\circ} 2'$  north, and between  $74^{\circ} 38'$  and  $78^{\circ} 36'$  east. Its form is that of a trapezium, with the lines joining opposite corners pointing nearly north and south and east and west. It has an area of 29,433 square miles, and a population in round numbers of 6,000,000. Its greatest breadth from east to west is 290 miles, and its greatest length from north to south 230 miles. It is surrounded on three sides by the Madras Presidency, and on the fourth by Madras and Bombay.

**Surface, &c.**—The country is naturally divided into two regions, the hill country towards the west called the **Malnad**, and the more open country towards the east called the **Maidan**. The scenery of the Malnād, with its grass-topped, forest-clad hills, is very varied and beautiful. On the plains of black soil in the north of the Maidan cotton or millet is grown, and in the south and west where the water supply is sufficient there are plantations of sugar cane and fields of rice.

**Climate, &c.**—In Mysore as in Hyderabad there are three seasons, the rainy, the cold, and the hot. The rainy season begins with the breaking of the monsoon early in June, and continues till the middle of November, the heavy rains of the latter part being due to the north-east trade wind popularly known as "the north-east monsoon". The cold season extends from the middle of November to the end of February, and is followed by the hot season, which lasts till the beginning of June. In the cold season the temperature sometimes is as low as  $51^{\circ}$ , and in the hot season it ranges between  $66^{\circ}$  and  $91^{\circ}$  in the shade, though in exceptional seasons it sometimes rises as high as  $96^{\circ}$ . The rainfall varies from as high as 360 inches on the top of the Western Ghats to as low as 19 inches in some parts of the centre. The heavy rainfall of the Malnad decreases rapidly as we go east, and over the whole country the average rainfall is less than 40 inches.



Rainfall, showing Effects of South-west and of North-east Monsoon in Southern India

Situated on a plateau, the average height of which is about 2000 feet, the climate of Mysore is exceedingly healthy; and, benefiting both by the south-west and by the north-east monsoon, Mysore suffers less from famines than any other internal tract of India. The bulk of the people are Dravidian, and their distinctive language is Kanarese, which is spoken by nearly three-fourths of the population. Telugu is the language of about 15 per cent of the people, but is confined to the extreme east of Mysore, chiefly to the Kolar district. Tamil is the language chiefly used at the Kolar gold fields, and by servants and camp-followers. Hindustani is the language of the Mussulmans, who form fully 5 per cent of the population. The bulk of the people are Hindus, eleven-twelfths of them indeed. The proportion of Hindus is actually higher in Mysore than in any province of India.

**Administration.**—The head of the state is His Highness the Maharaja of Mysore, but the administration is carried on by the Diwan or Prime Minister, assisted by two councillors. The chief court consists of three judges, headed by the chief

judge. The capital of the state is **Mysore**, but the chief town and administrative centre is **Bangalore**.

There is a representative assembly which meets once a year at Mysore.

For administrative purposes the state is divided into eight districts. These are: **Bangalore**, **Kolar**, **Tumkur**, **Mysore**, **Hassan**, **Kadur**, **Shimoga**, and **Chitaldroog**. Each district is managed by a Deputy-Commissioner with a staff of assistant commissioners, and is divided into taluks, each under an amaldār assisted by a sheristadār. The village headman is the patel, and he is assisted by the shānbhog, a Brahman accountant.

**Towns.**—**Bangalore**, the administrative capital of Mysore, stands at a height of over 3000 feet above sea-level. It is a rapidly-growing city, has a healthy climate, and manufactures carpets, silks, and cottons. It has a population approaching 200,000. **Mysore**, the dynastic capital, is an attractively built town with the Maharaja's palace, and a British Residency. Its leading industry is carpet-weaving.

**Seringapatam**, the capital of Hyder Ali and of his son Tipu, is now but a shadow of what it formerly was.

**Coorg** is a small British province in Southern India on the slopes of the Western Ghats, and lying west of the native state of Mysore.

It has an area of nearly 1600 square miles and a population of 180,000. It is a forest-clad, hilly region, the summits of the hills covered with coarse grass and the valleys filled with evergreen woods. Its chief river is the Cauvery. Its climate is moist and mild; the rainfall at **Mercara** averaging about 130 inches a year. Rice is the staple product, but coffee- and tea-planting have been tried, though not very successfully. The fruits include plantain and oranges.

The province is under the control of a chief commissioner, who is the Resident in Mysore. It is divided into five taluks, each under a sūbedār. The taluks are further divided into nāds, and the nāds into māgani or circles, and these into villages.

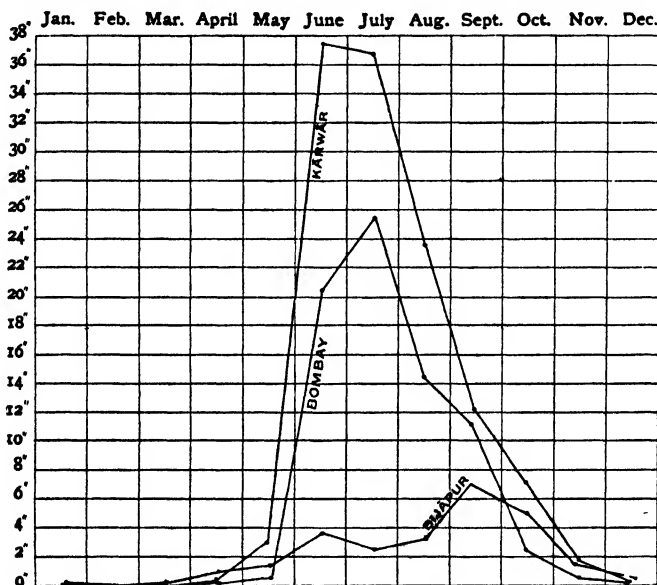
## Bombay Presidency

Bombay Presidency has a total area of 123,000 square miles, and a population in round numbers of 20,000,000. In addition there are a large number of native states under the Bombay Government. These have an area estimated at nearly 64,000 square miles, and a population of over 7,000,000.

The total number of states under the Bombay Government is close on 400. Within the geographical bounds of the presidency are included

also the Portuguese possessions of Goa, Daman, and Diu, with an area of nearly 1500 square miles, and a population of over half a million. Aden is also an outlying part of the Bombay Presidency. It has an area of 80 square miles, and a population of between forty and fifty thousand.

Bombay is bounded on the north-west by Baluchistan, on



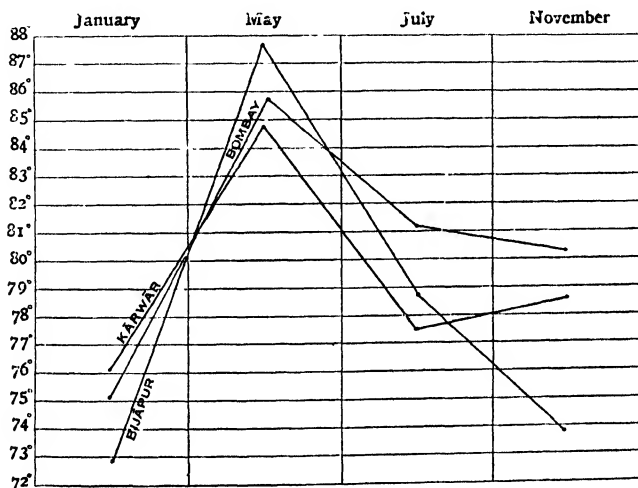
Rainfall, Bombay Presidency

the north by the Punjab, and on the north-east by the Central Provinces and the native states of Rajputana, on the east by the Central Indian native states, by the Central Provinces and Hyderābād, on the south by Madras and Mysore, and on the west by the Arabian Sea.

The presidency, including the native states under its government, lies partly in the Great Indo-Gangetic Plain, partly in the Central Highlands, and partly in the Deccan. The parts belonging to the Great Plain and to the Central Highlands have already been partially discussed. The portions of the Presidency belonging to Gujarāt were purposely omitted when Central India was taken up. They form the

northern division of the Presidency, and consist of **Ahmadabad, Broach, Surat, Kaira**, and **Panch Mahals**. Their physical aspect, soil, and climate have already been dealt with.

**Climate.**—The rainfall is almost entirely confined to the months between May and November. The heaviest rainfall is on the Konkan, where the average is from 100 to 300 inches. The Konkan is hot and moist, but except in the hot season the



Temperature, Bombay Presidency

climate of the Deccan tableland is agreeable. On the tableland during the monsoon the climate is cool and pleasant; and during the short cold season it is actually bracing, forming an agreeable contrast to the climate of the Konkan.

As in all parts within the Tropics the range of temperature during the year is very slight, much slighter, as will be seen, on the coast regions, that is, on the Konkan, than in places farther inland. While there is scarcely ten degrees of difference in the annual average temperature, the daily range of temperature is much higher, reaching at Poona, for example, in the cold season to over thirty degrees, and throughout the year averaging fully twenty-four degrees, while the average daily range of temperature at Bejapur is only a little less.



During the prevalence of the monsoon floods are not uncommon, and these are often accompanied by cyclones which do great damage.

The black cotton soil formed by the weathering of the Deccan trap is the soil most characteristic of Bombay. Of this the broad wheat, cotton, and jowar lands of Khandesh, Nasik, Ahmadnagar, Sholapur, Bijapur, and Dharwar are formed.

Among the hills the soil is lighter and less fertile, and in the south-west the laterite is terraced into rice fields, and the beds of the streams grow rice in the hot season. Clayey loams of great natural fertility form the greater part of the soil of Belgaum and Dharwar. The black cotton soils grow the richest crops, wheat, cotton, jowar, grain, and bajra; and the light soils on the hill slopes, the soils known as *varkas*, are in some cases used to grow coarser grains.

**People.**—The people of the presidency are chiefly of mixed Scytho-Dravidian stock. The languages spoken are Marathi, Gujarāṭī, Kanarese, Sindi, and Hindi.

**Marathi** is supposed to include Konkani, the dialect spoken in the Konkan, and is the language spoken by two-fifths of the people in the presidency and the native states included in it.

**Gujarāṭī** is spoken by nearly one-third of the population, Kanarese and Sindi each by about one-ninth, and Hindi by between four and five per cent.

Fully seven-ninths of the people are Hindus in religion, and about one-sixth are Mussulmans. Of these the bulk are Sunnis. Jains number over half a million, Christians about a quarter of a million, while animists and Parsis are said each to number nearly one hundred thousand.

**Administration.**—The affairs of Bombay are administered by a Governor-in-Council. The Council consists of the Governor as President, and two members of the Indian Civil Service appointed by the Crown.

Under the Governor of Bombay in Council the affairs of the presidency are administered by four commissioners, the Commissioner of Sind, who has special powers, and the Commissioners of the northern, central, and southern divisions.

**Sind** and the northern division, each of which consists of six districts or collectorates, have already been dealt with. The central division consists of the districts of Poona, Sātāra, Sholapur, Nasik, East Khandesh and West Khandesh, and Ahmadnagar; the southern division consists of Belgaum, Dharwar, Bijapur, Kanara, Ratnāgiri, Kolāba. The head-quarters of the Commissioner of the central division are at Poona, and those of the Commissioner of the southern division at Belgaum.

In each district there are Indian Civil servants who act as

assistant collectors and are in charge of the sub-divisions. There is also a deputy-collector of the Provincial Service in charge of each district treasury.

On an average there are in each collectorate from eight to twelve **talukas**, each consisting of from one hundred to two hundred government villages. The village authorities consist of the patel or headman, who has charge of the village, the clerk, and the accountant. Over each taluka or group of villages there is an official called the **mamlatdar**, who is responsible for the revenue of the taluka.

## Towns

**Bombay City** and Island has a population of 1,000,000. It is beautifully situated, and is the natural outlet for the trade of India with Africa, Europe, and the West. Its broad streets, well-built houses, and numerous fine public buildings strike the visitor, as do the artificial embankments of the harbour with their long lines of docks and warehouses. It is connected by railway with Delhi, Calcutta, and Madras, and is a great manufacturing as well as commercial centre. It has numerous well-managed educational institutions, among which may be mentioned the Grant Medical College, the Elphinstone College, the Bombay Law School, the Wilson College, the St. Xavier's College, the Sir Jamsetji Jijibhoy School of Art, and the Victoria Jubilee Technical Institute. The New High School, established over thirty years ago, is said to be the largest in the British Empire.

**Ahmadabad**, the chief city of the District of Ahmadabad, has a population approaching a quarter of a million. It is the largest of the cities of Gujarat, and stands on the left bank of the Sabarmati fifty miles north of the head of the Gulf of Cambay. It was built by Sultan Ahmad of Gujarat early in the fifteenth century, and is said at one time to have had 900,000 inhabitants.

**Poona** lies 119 miles south-east of Bombay on the Great Indian Peninsula Railway, and is a terminus of the Southern Mahratta Railway. It has a population of about 160,000. It was the capital of the Peshwa, the nominal head of the Maratha Confederacy, but was taken by the British in 1818.

**Surat** was once the seat of the presidency and the chief commercial city of India. Even towards the close of the eighteenth century its population was estimated at 800,000. It now numbers over 120,000.

## Native States

The Bombay Government exercises control over the native states of the presidency through Political Agents.

The native states with which we have yet to deal belong either to the Konkan, to the Deccan, or to the Carnatic.

There are a great many of these states, though of the 377 native states in the Bombay Presidency no fewer than 187, or half the number, belong to the Kathiawar Agency.

Among the chief of the southern native states are **Kolhapur** and **Sāvantvādi**, in each of which the Government is represented by a member of the Bombay Political Service, an agent who corresponds with the Darbar. Kolhapur and its feudatories have an area of a little over 3000 square miles, and a population of close on a million, while Savantvadi has an area of 925 square miles, and a population of nearly a quarter of a million.

The native states are either in direct relation with the Government or subordinate to states so related, their status being guaranteed by the Government. The affairs of each state are managed by a Darbar of ministers under the chief, and they issue orders to the executive annually through the chief minister, the Diwan.

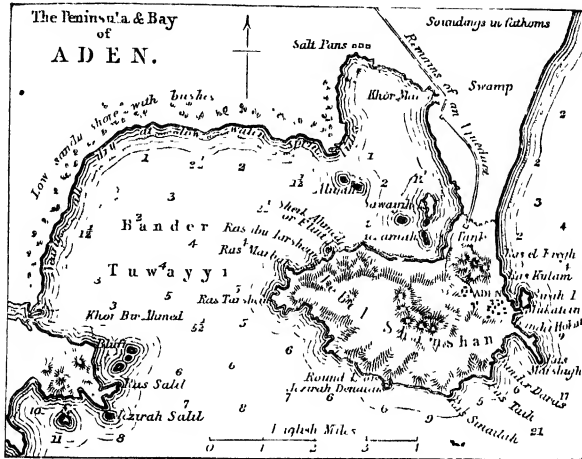
The northern groups of these states lie in the region of Deccan trap, and consist, the easternmost of them, of steep, wooded, flat-topped hills, mostly of black soil. The parts to the west of the centre of the Western Ghats or Sahyadri range are remarkable for their beautiful and heavily-wooded valleys. The heavy rainfall on the hill slopes makes this a true forest region.

**Towns.**—**Kolhapur**, the capital of the state or the same name, lies at the western end of the Kolhapur State Railway, which joins the Southern Mahratta Railway at Miraj.

## Aden

The Settlement of **Aden** consists of a couple of peninsulas and isthmuses, and a fortified camp, under the Government of Bombay. The peninsulas are Aden to the east and Little Aden to the west. The site includes a huge crater, with a flat floor a thousand yards broad, on which the town lies, surrounded by precipices, the highest nearly 2000 feet. There is a great gap in the crater on the side next the sea, opposite the island of Sirah, which protects the outer harbour.

The harbour, which stretches eight miles from east to west and about four miles from north to south, is divided into two, an outer and an inner, by a spit of land. The settlement is exceptionally free from epidemics, and ranks as a healthy station for troops. **Perim** island and the island of Sokotra, 130 miles east of Cape Guardafui, and the Kuria Muria islands off the coast of Arabia, are dependencies of Aden.



### Portuguese Possessions

**Portuguese Possessions:** These include Goa, which includes the capital, **Panjim**, and the dependencies of Goa, the island of **Anjidiv** and the territory on the mainland, with an area of over 1300 square miles and a population of about half a million. They include also the settlement of **Damão** or **Daman**, with an area of 149 square miles on the coast of the Thana District, about 100 miles north of Bombay, and the island of **Diu**, near the extreme south point of the Kathiawar peninsula. Diu is about 20 miles in area, and has for dependencies the village of **Gorgola** on the mainland and the fort of **Simbor** on an islet 12 miles from the town.

### Ceylon

**Position, &c.**—Ceylon, a large island in the Indian Ocean to the south-east of the Deccan, of which it must at one time have formed a part, lies between  $5^{\circ} 50'$  and  $9^{\circ} 50'$  north and between  $79^{\circ} 48'$  and  $81^{\circ} 52'$  east. Its greatest length from north to south is 270 miles, and its greatest width from east to west

is 140 miles. It has an area of over 25,000 square miles, and a population of over 4 millions.

It is almost connected to India by Adam's Bridge, a ridge of sand and rocks 17 miles in length between the islands of Rameswaram and Manaar, and forming part of a chain of low coral reefs and sandbanks, 62 miles long, running between the Gulf of Manaar and Palk Strait.

**Climate, &c.**—The climate of Ceylon differs very little from that of the neighbouring parts of India. In Ceylon, as in the south-eastern Deccan, there are two monsoons, the south-west and the north-east. The nearness of Ceylon to the Equator causes the length of the day all the year round to be nearly the same, and being in the tropical forest region renders its flora particularly rich. Its climate, too, is subject to but slight variation either diurnal or annual. The average daily range at Colombo is only  $12^{\circ}$ , while the average temperature of the hottest month is  $82.6^{\circ}$ , only  $3.5^{\circ}$  higher than that of the coldest, which is  $79.1^{\circ}$ .

**Productions.**—In ancient times Ceylon was covered by her rulers with a network of irrigation tanks and reservoirs, which enabled it to become the granary of Southern Asia. Even now, however, little more than one-fifth of the total surface is under cultivation, while the land capable of cultivation is at least three or four times greater. Thick forests cover about one-fifth of the entire surface.

Rice is the chief grain grown, and, next to coco-nuts, the product to which the largest area of the cultivated land is devoted; about one-fifth of the whole cultivated surface is devoted to rice-growing. In some parts, where the water supply is abundant, rice is allowed to depend on the natural supply, but generally its cultivation is not attempted unless sufficient water supply is secured by means of wells and reservoirs. Ceylon, rich as its soil is in many parts, and excellent as its climate is, does not produce grain sufficient for its needs, but imports rice largely from Burma. The coco-nut palm covers about a half more of the cultivated area than rice does, and the value of the coco-nut palm products exported amounts to over £2,000,000 sterling. **Tea-planting**, next to rice-growing and coco-nut-growing, occupies the largest area of cultivated land, and in tea production Ceylon is a formidable competitor of India and China. Nearly 1000 square miles of the island are devoted to the cultivation of the tea plant, and the export of teas has grown rapidly in recent years, and now amounts to over 200,000,000 lbs. Formerly coffee was the chief product, and since

coffee-planting failed the growth and export of cocos has steadily extended. Of recent years **rubber-planting** has become an important industry. In 1900 the export of rubber was less than 10,000 lbs., and the area under rubber was less than 2000 acres; in 1910 the export of rubber was over 3,000,000 lbs., and the area under rubber nearly 200,000 acres. In 1912, 15,000,000 lbs. of rubber were exported. Tobacco is largely cultivated in some parts of the island, but its growth does not seem to be extending.

**Elephants** are still common, and are carefully preserved; **leopards** are numerous, especially in the mountain forests; and a small black **bear** is met with in the rocky parts of the north and east. The oxen are of small size but handy, and **buffaloes** exist in great numbers. There are several kinds of deer and several kinds of monkeys, and **rats** are numerous, as are squirrels and porcupines. There are many kinds of birds, some of them with splendid plumage, but yet not to compare with those of northern India and South America. Eagles are small and rare, hawks and owls abound, and the island is exceedingly rich in wading and water birds.

The most important mineral industry of the island is digging for **plumbago**. The industry gives employment to fully 100,000 men and women, chiefly Sinhalese, and the annual export amounts to nearly 40,000 tons. The only other mineral industry is the search for **gems**. The manufactures are few, though iron and engineering works are numerous in Colombo, and the Sinhalese are skilful carpenters.

**Commerce, &c.**—In 1913 the total imports into Ceylon were over £13,000,000 sterling, and the total exports over £15,000,000. The chief imports were cotton piece-goods, rice, coal, coke, spirits, sugar (raw and refined), manures, bullion, and spice. The chief exports from the island were tea (nearly £6,000,000), rubber (nearly £5,000,000), copra and coco-nut oil, plumbago, cacao, cinnamon, and areca nuts.

**People.**—Of the inhabitants of the island 2½ millions are Sinhalese (Low-country Sinhalese and Kandyan Sinhalese) and about 1 million are Tamils. The remainder include Moormen, Burghers, and Eurasians, Malays, Europeans, and Veddahs. The latter, probably the descendants of the aboriginal inhabitants, number less than 4000.

The **Moormen** or Muhammadans, who number fully a quarter of a million, are descendants of Arab traders or conquerors of early times who settled on the west coasts of India and Ceylon, married with the Tamil women, and formed a race which has since aimed at keeping itself distinct. **Eurasians** are known as **Burghers**, and occupy a much more influential position on the island than their numbers would indicate. They are the doctors, lawyers, Government and other clerks and

employees in business houses in Colombo. Europeans number about 10,000, mostly English, but they are by far the most influential and most important element in the population. They are members of the ruling race; carry on the principal businesses; conduct the most important enterprises; and hold all the chief positions in the Government services. Buddhism is the religion of the Sinhalese, with the exception of some 200,000 who are Christians. The Tamils, on the other hand, are Hindus, while the Moormen are Mussulmans. With regard to numbers there are between two and three million Buddhists, nearly a million Hindus, between three and four hundred thousand Christians, and fully a quarter of a million of Muhammadans.

**Administration.**—The affairs of the Crown Colony of Ceylon are administered by a Governor, with the help of an Executive Council of six members. The Executive Council consists of the Colonial Secretary, the commander of the troops, the Attorney-General, the Controllers of the Revenue, the Treasurer, and an additional member nominated by the Governor.

**Chief Towns.**—Colombo, the capital of Ceylon and chief seaport, near the mouth of the river Kelani, has a population of nearly a quarter of a million, and is one of the great ports of call of the East. Galle, on the south-west coast, exports tea, coco-nut oil, and plumbago.

Other important towns are Jaffna, Kandy, and Trincomali.

### The Maldivé Archipelago

The **Maldivé Archipelago**, 400 miles south-west of Ceylon, and lying on the Equator or immediately to the north of it, and directly south of the Laccadives, consists of seventeen groups of islands, thinly peopled by a mixed race, probably of Aryan stock, and speaking a dialect closely akin to Sinhalese. The islands are a dependency of Ceylon, to which the Sultan sends an embassy annually.

The islands, which stretch from 1° S. to 7° N., form throughout the greater part of their length a double chain of atolls or coral islands. They are covered with coco-nut palms, and yield, besides copra, millet and fruits. The inhabitants have for over six centuries been professed Muhammadans. The government of the island is theoretically in the hands of an absolute sultan, who is invariably chosen from one particular family; but he is little more than a figurehead, and is really controlled by a few of the members of certain families in Malé, the principal island. Communication with the outside world is mainly with India and Ceylon, and that by means of native craft. The chief trades in the Maldives are boat-building, rope-making, cloth-making,

carpentering, lacquer work, and embroidery. Metal and earthenware vessels are imported.

The **Laccadive Islands**, 200 miles to the north of the Maldives, are managed by the Indian Government. They consist of five separate groups of coral islands between  $10^{\circ}$  N. and  $14^{\circ}$  N., and are peopled by a half-caste Indo-Arabian race which, like the people of the Maldives, professes Muhammadanism.

## ANDAMAN AND NICOBAR ISLANDS

The Andaman and Nicobar Islands consist of the summits of the ridge by which the **Arakan Yoma**, the most western of the loop of folded mountains depending from the eastern Himalayas, is continued southward to Sumatra and the East Indian Archipelago.

North of these islands are the Coco and Preparis groups, part of Burma. The Andaman Islands consist of two groups: the **Great Andaman**, embracing north, middle, and south Andaman, and the **Little Andaman**, separated from the others by Duncan Passage.

**Surface, &c.**—The Andaman Islands form a mass of hills running from north to south, and separated by narrow valleys, the whole covered with a most luxuriant tropical vegetation. The area of the Andamans is 2508 square miles, and the highest point—Saddle Peak in the North Andaman—is over 2400 feet high. Narcondam, a volcanic island 70 miles east of North Andaman, reaches a height of over 2300 feet. Little Andaman is flat.

There are no rivers and few permanent springs in the islands, but the coasts are deeply indented, and there are numerous safe harbours. The islands are inhabited by tribes of Negritos, but the race seems to be dying out.

The **Nicobar Islands** have a total area of little more than 600 square miles. They lie south of the Andamans, and number in all nineteen, of which seven are inhabited. They are structurally a continuation of the Andamans, and reach in Mount Thuillier in Great Nicobar a height of more than 2000 feet.

As in the Andamans, there are no native dangerous wild animals, though crocodiles are met with in the rivers and on the coasts, and monkeys in Great and Little Nicobar.



**Port Blair:** The penal settlement in South Andaman, and the islands attached to it cover an area of 473 square miles, of which 327 are occupied. The penal settlement centres round the harbour of Port Blair, and has its head-quarters on Ross Island.

The settlement is divided for administrative purposes into two districts, and each of these is further divided into two subdivisions. Within the subdivisions there are stations where labouring convicts are kept, and villages where either "free" settlers or "self-supporters" live. The number of convicts in the settlement in 1914 was about 12,000, while the total population of the Andaman and Nicobar group—that is, of the Commissionership—was between twenty-five and twenty-six thousand. The population consists of the convicts, their guards, the supervising, clerical, and departmental staff, with the families of the latter, and a limited number of "free" settlers.

